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ABSTRACT

This instructor's guide accompanies the self-paced student training modules on trowel trades, four of which are available separately as CE 032 869-872. Introductory materials include an introduction to pre-apprenticeship and its three phases of training, a recommended procedure for conducting pre-apprenticeship training, and a course outline. Teaching outlines are then provided for the 12 modules that comprise this course. For each module some or all of this material may be presented: instructional outcomes; introduction; outline of content with teaching methods and aids listed and/or sketched, notes for self-assessment, assignment, and post assessment; and suggested readings. Modules include Introduction to Trowel Trades, Diagnostic Testing/Trowel Trades and Drywall/Plasterer, Survival Skills, Trade Math (diagnostic test and remedial work), Physical Requirements, Safety, First Aid, Blueprint Reading, Tools, Materials, Trowel Trades Processes, and Basic Trowel Trade Techniques (student projects). Project sheets are provided. An occupational analysis/task inventory for bricklayer and cement finisher is appended. (YLB)

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INDIVIDUALIZED LEARNING SYSTEMS

PRE-APPRENTICESHIP

PHASE 1 TRAINING
Instructor's Guide

Trowel Trades

Diagnostic Tests
Survival Skills
Math
Tools
Materials
Project

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CE032868

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NATIONAL INSTITUTE OF EDUCATION

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INDIVIDUALIZED LEARNING SYSTEMS

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INTRODUCTION TO PRE-APPRENTICESHIP

DESCRIPTION OF APPRENTICESHIP

The Federal Bureau of Apprenticeship identifies an apprenticeable occupation as a skilled occupation that requires a minimum of one year of 2000 hours on-the-job training. This on-the-job training and related educational training is the apprenticeable period.

VIEWPOINTS ABOUT PRE-APPRENTICESHIP

Pre-apprenticeship is viewed in many different ways by craftpersons, apprenticeship committees, educators and the general public.

Concerns about pre-apprenticeship include the belief that the pre-apprenticeship training will flood the market with applicants for apprenticeship or that these trainees will go to work in the occupation as partly trained workers or that pre-apprenticeship would be considered a guarantee of entry into apprenticeship. These conflicting viewpoints create problems for persons interested in apprenticeship training and make it difficult to operate pre-apprenticeship training programs.

NEED FOR PRE-APPRENTICESHIP

Pre-apprenticeship provides three benefits:

1. Provides a screening device to determine motivation, interest, manipulative aptitude and ability of persons to learn the skills of the occupation.
2. Provides the individual with survival skills for handling personal problems and interpersonal relations on the job that may include abuse and sexual harrassment.
3. Provides entry level skills to help make the apprentice productive from the first day on the job. The higher entry level skills of the apprentice provides an incentive for the employer to hire apprentices.

PRE-APPRENTICESHIP HELPS PEOPLE

To select a skilled occupation.

To identify the educational requirements of an occupation.

To experience the hands-on skills of an occupation.

To develop good work habits.

- * Good job attendance
- * Punctuality
- * Dependability
- * Time management

To develop good attitudes.

- * Concern for the job
- * Initiative
- * Interest
- * Healthy, cooperative working relations with fellow employees.

TRAINING LEVELS FOR PRE-APPRENTICESHIP

Pre-apprenticeship training can be separated into three phases or stages of training. These are:

PHASE 1

Provides the trainee with an opportunity to explore several occupations. This orientation to the floor covering trade includes training in trade terminology, blueprint reading, tool usage, first aid and safety practices. This familiarization training includes hands-on experience in some of the basic skill areas together with information about the advantages and requirements of floor covering. The choice of an occupation to train for in Phase 2 of pre-apprenticeship will be based on these experiences. If the trainee decides not to pursue this occupation any further, the training received to this point will be useful in every day life.

Phase 1 includes diagnostic tests to determine if reading or mathematical deficiencies exist that would handicap a person in the floor covering trade. Remedial work will be provided to correct these deficiencies.

Success on the job is directly related to job attitudes, work habits, and the individual survival and coping skills. Training will begin on helping each individual attain full potential in these personal skills.

Interpersonal skills will be developed which include:

- * Communication skills
  - paraphrasing, perception checks, non-verbal communication
  - communicating with superiors
- * Personal effectiveness
  - problem solving, family relationships, sexual harrassment and pestering on the job.
- * Interview techniques
  - apprenticeship committee interview procedure

PHASE 2

This training begins the serious preparation for an occupation. The training related to job attitudes, work habits and individual survival and coping skills will be continued from Phase 1 with more emphasis on the relationship to the job.

Manipulative skills will be developed by the completion of a series of projects involving basic trade skills which have a carryover benefit to persons outside of the occupation. At least 3/4 of the training will consist of hands-on experiences. This instruction should be conducted by a skilled craftsperson from the trade or occupation who has the necessary teaching skills.

The joint apprenticeship committee for the occupation will be invited to observe the progress of trainees during Phase 2 and to evaluate the potential for trainees for entry into apprenticeship. The participation of the appropriate joint apprenticeship committee is essential to the success of a pre-apprenticeship program. This community involvement insures that the training is relevant to the occupation and meets industry training standards.

At the completion of Phase 2 the trainee will have enough experience with the occupation to decide whether to continue with the training into Phase 3. The joint apprenticeship committee will have knowledge of the quality of the training program and will be in a position to judge the qualifications of the students for entry into the apprenticeship training program.

PHASE 3

Training is concentrated on improvement of manipulative skills so that the trainee will be a productive employee the first day on the job. This training can be either industry conducted specialized training, secondary school vocational programs or community college preparatory courses specifically related to the occupation. Trainees can also participate in co-op work experience involving hands-on training at the secondary or community college level. Hands-on training is considered essential for an effective pretraining program.

The Phase 3 training period provides the trainee with an opportunity to search for an employer willing to take an apprentice. Frequently the employer providing co-op work experience training will hire the trainee as a regular employee.

It is possible that some employers will hire the trainee without further training. Some of these employers train specifically for their own needs. In the process, job descriptions have become highly diluted. Instead of producing journeymen possessing a wide range of skills, companies have settled for specialists trained to perform the specific tasks needed in certain narrow operations. While this may be adequate to meet the special needs of an industry, it certainly will not meet the training and manpower needs of the nation in the future.

Apprenticeship provides a broad base of training by giving the apprentice a wide range of skills which insures continuous employment. Workers least vulnerable to unemployment are those with the highest and broadest skills and best training. The trainee should make every effort to enter an apprenticeship training program designed to provide training in all skills required in the trade or go to work for an employer who will provide broad based training.

Each trainee will choose a joint apprenticeship committee meeting to attend during Phase 3 training. This will provide an opportunity for the trainee to become acquainted with members of the joint apprenticeship committee and to see how the committee functions.

PHASE 4 EMPLOYMENT AS AN APPRENTICE

Trainee enters apprenticeship training on a direct referral basis under agreement with the appropriate joint apprentice committee which permits persons trained in programs financed with federal funds to enter apprenticeship on direct referral. Direct referral eliminates several of the procedures in the selection process and makes entry into apprenticeship less cumbersome.

Not all joint apprenticeship committees use the direct referral system. This is the reason why sponsors of pre-apprenticeship training should directly involve joint apprenticeship committees in the operation of their programs. This provides committees with an opportunity to evaluate the effectiveness of pre-apprenticeship.

The federal Job Corps Programs enjoy direct referral placement in apprenticeship for their graduates. The Job Corps operates an ideal pre-apprenticeship program. Proposed sponsors of pre-apprenticeship training are advised to visit the nearest Job Corps Center to see how the programs operate.

The Job Corps Centers in Oregon are located at:

Angel Job Corps
Star Route North
Yachats, OR 97498
547-3137

Timber Lake Job Corps
Star Route Box 109
Estacada, OR 97023
834-2291

Wolf Creek Conservation Center
Little River Route
Glide, OR 97443
496-3507

Tongue Point Job Corps
Astoria, OR 97103

325-2131

Job Corps Centers in Oregon Offer Training in these apprenticeable occupations:

- Carpentry
- Cement Mason
- Brick Laying
- Plastering
- Tile Setting
- Automotive Painting

RECOMMENDED PROCEDURE FOR CONDUCTING PRE-APPRENTICESHIP TRAINING

ADMINISTRATION

Pre-apprenticeship training can be conducted by various sponsors. These include: secondary schools, community colleges, unions, employer associations, labor/management training trusts and private groups such as O.I.Cs.

ADVISORY COMMITTEES

Use of broad-based community advisory committees is mandatory for pre-apprenticeship programs conducted by secondary schools and community colleges. Pre-apprenticeship needs the support and recognition of the community in order to be successful.

The advisory committee should have representatives from these groups:

- School administration
  - high school principal
  - board members
  - vocational director
  - co-op work experience
  - T & I instructors

- Community
  - school graduate in trade
  - member of joint apprenticeship committee
  - employer member of trade
  - employee member of trade
  - union business agent
  - industry training coordinator
  - representative of financial community
  - representative of press

- Government personnel
  - ESD regional vocational coordinator
  - Oregon Division of Apprenticeship field representative
  - Federal Bureau of Apprenticeship representative
  - State Dept. of Education specialist

FINANCING

Vocational training programs generally cost more than academic programs because the student/teacher ratio is smaller, consumable supplies are required, and expensive equipment is needed. Resources to finance pre-apprenticeship training are available from a number of sources. These include:

Vocational rehabilitation	-tuition fees
Federal funds for immigrants	-Asian -Cuban -Spanish American
Special grants	-U.S. Dept. of Labor U.S. Dept. of Education CETA Industry State Dept. of Education Economic Development Administration
Secondary school funding	-basic school grant from federal funds
Community college funding	-basic state funding

INSTRUCTIONAL DELIVERY SYSTEMS

The type of sponsor for pre-apprenticeship training will determine the time-block used for the program. If training is started at the 9th grade level, a two-hour training period will generally be used. A half-day training period should be used for an accelerated program at the secondary level covering two years. Community college programs can be either half-day or full-day programs. Private sponsors generally will operate on a full-day basis.

Instructors for the trade specific training should be qualified craft workers. These may be employed on a part-time basis, or full-time, serving several programs. The necessity for skilled workers to teach the trade specific items of the program cannot be over-emphasized. The work experience of skilled craft workers gives them the insight into the occupation needed for effective teaching.

MANIPULATIVE SKILL TRAINING

The manipulative skills or hands-on experiences provide the basis for a sound and effective pre-apprenticeship training program. Unless this training is available the program will not succeed.

Important considerations involve the following items:

Basic tools	-tools required for each participant
General or shop tools	-power tools (purchased or rented)
Materials	-purchased by training agency -purchased by others (training project sponsor) -donations by industry (defective goods)
Training facilities	-school based -community based
Training projects	-school maintenance work -simulated projects -community projects -private projects (non-profit organizations-low income persons)

COORDINATION WITH EXISTING PROGRAMS

Pre-apprenticeship should be coordinated with related programs in secondary schools and community colleges.

Welding
Blueprint reading/drafting
Surveying
Automotive
Electronics
Industrial mechanics cluster
Construction cluster
Electricity/electronics cluster

MISCELLANEOUS CONSIDERATIONS

Legislation, community support and political considerations will all have an effect on pre-apprenticeship training. Activities related to these concerns include:

Workshops and technical assistance	-State Dept. of Education
Publicity notices	-public service -newspaper -radio -translation to Asian/Spanish American
Civil rights	-effect of civil rights compliance
Transfer of learning	-benefits of vocational training to other occupational endeavors

COURSE OUTLINE

1.0 Introduction to the Trowel Trades

- 1.1 History
- 1.2 Trends
- 1.3 Working Conditions
- 1.4 Places of Employment
- 1.5 Hiring Practices
- 1.6 Wages
- 1.7 Common Worker Benefits
- 1.8 Trade Terminology

2.0 Diagnostic Testing

- 2.1 SATB

3.0 Survival Skills

- 3.1 Expectations
- 3.2 Communication Skills
- 3.3 Giving and Receiving Feedback
- 3.4 Dealing with Interpersonal Conflict
- 3.5 Group Problem Solving, Goal Setting and Decision Making
- 3.6 Wider Influences and Responsibilities
- 3.7 Identifying and Developing Individual Strengths
- 3.8 Worksite Visits
- 3.9 Resumes
- 3.10 Interviews
- 3.11 Appropriate Work Habits and Attitudes

4.0 Trade Math

- 4.1 Math Diagnosis
- 4.2 Math Remedial

5.0 Physical Requirements

- 5.1 Physical Requirements
- 5.2 Developmental Processes

6.0 Safety

- 6.1 General Safety
- 6.2 Personal Safety
- 6.3 Fire Safety
- 6.4 Hygiene Safety
- 6.5 Hand Tool Safety
- 6.6 Power Tools

7.0 First Aid

- 7.1 First Aid

8.0 Blueprint Reading

- 8.1 Scaling and Dimensioning
- 8.2 Sketching
- 8.3 Drawing Types and Views

9.0 Tools

- 9.1 General Tools
  - 9.1.1 Plastering
  - 9.1.2 Cement Finishing
  - 9.1.3 Bricklaying
  - 9.1.4 Tile Setting

10.0 Materials

- 10.1 General Materials
  - 10.1.1 Plastering
  - 10.1.2 Concrete
  - 10.1.3 Bricklaying
  - 10.1.4 Tile Setting

11.0 Trowel Trades Processes

- 11.1 General Processes
  - 11.1.1 Plastering
  - 11.1.2 Cement Finishing
  - 11.1.3 Bricklaying
  - 11.1.4 Tile Setting

12.0 Project

II. WORD TO THE INSTRUCTOR

This course was designed to be a trade-related, self-screening, job exploration package, providing the student with basic trade theory, basic trade manipulative practice, projects and on-job-site visitations.

Further, it is to be implemented by instructors who are skilled in each of the general topics described in the course outline and expanded on in the instructor's guide.

The curriculum is comprised of two parts: 1) the instructor's guide, and 2) supporting modules and references which are specified in the instructor's guide. The instructor should seek other supporting resources where available or necessary.

The instructor should bear in mind that there are two broad objectives written into the design of this course: 1) that the student will receive instruction in the preapprenticeship mode of the trade (which is designed to enable him or her to gain enough exposure to the trade to (a) aid in making a career decision, and (b) facilitate entry into the trade), and 2) that the student will retain some carryover skills which he or she can use in life, even should the student decide not to enter the trade.

Essentially, this guide is patterned after a program begun in Oregon in 1979-80. The participants in the program are wholly CETA-sponsored, many with motivational or physical impairments. The program concentrates on providing motivational support and/or physical therapy. A typical program, broken down into its major components, would be:

40%	hands-on, manipulative work
30%	motivational support work
10%	job visitation
5%	physical development or therapy
15%	class lecture, discussion, etc.

Not all institutions will have the resources, nor will all programs' students have the need, for such a breakdown. The instructor should identify the needs of the students and utilize the guide in the manner best suited to meet them.

III. RECOMMENDATIONS

Hands-on work is probably the best learning experience for students in trade work. It is essential if the two broad objectives listed above are to be met. Therefore, implied in the topics covering tools, materials and tasks or work processes is the notion (emphasized in the Instructional Outcome for these topics) that the student will practice using the tools and materials described therein.

In lieu of describing in the Teaching Methods and Aids section of the guide those tasks which will be performed with the described tools and materials, the writers leave it to the imagination and material resources of the instructor. Practice is the method by which skill is developed.

1.0 Introduction to the Trowel Trades

INSTRUCTIONAL OUTCOMES: The student will be able to identify and briefly explain the history, trends, working conditions, places of employment, hiring practices and wage scale, as well as working people's benefits and trade terminology.

INTRODUCTION: In order to become an effective worker or make an effective realistic career decision, an individual must be exposed to various aspects of the trade.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
1.1 History	Explain and Discuss
A. Masonry is the craft of building with stone.	ILS Introduction to the Trowel Trades
B. Egyptian pyramids and huge temples are evidence of the ancient development of masonry.	
1. The great pyramid of Khufu has masonry joints less than 1/100" thick.	
C. Greek masons developed Doric, Ionic and Corinthian architecture.	

D. Romans used the forms the Greeks had developed, but the stones were used for surface decoration, not for construction.
   1. After the Romans invaded Britain, building there grew rapidly.

E. Masonry in Britain was discontinued for the next 200 years.

F. Masons from France and Italy were brought to England to re-establish the craft.

G. During the 14th and 15th centuries, Gothic Cathedrals were constructed.

H. After the 15th century, stone was used extensively as a building material.

I. Brick production reduced the demand for stonework.
   1. Brick is still used as a backing to masonry in solid wall construction.

J. Stone became an ornamental work with steel or reinforced concrete forming the frame of the building.

K. A great deal of the mason's heavy work can be done by machinery today.

L. Skilled masons are still in demand for repair and maintenance work on historical buildings, as well as new construction.

1.2 Trends

A. Employment for trowel trades workers is expected to increase rapidly during the 1980s.

B. As population and economy grow, masons will be needed to build apartments, offices, highways and other structures.
   1. A greater use of concrete as a building material.

C. New products such as epoxy and latex flooring systems stimulate the demand for cement workers.

D. Employment of cement masons is not expected to rise as rapidly as the use of concrete products.
   1. Many concrete products are pre-cast and do not require finishing.

E. Construction methods and materials have improved worker efficiency and reduced the need for as many skilled employees.

1.3 Working Conditions

A. Masonry work is active and strenuous.
   1. Most cement finishing is done at ground level, while other trades may work on scaffolding stories high.
   2. Workers must often stoop, bend and kneel.

B. Most jobs are outside and work halts during rainy or freezing weather.

Jobsite Visitation
Invite Job Specialist

1.4 Places of Employment

A. The majority of trowel trades workers in 1978 worked for general contractors who construct entire project.

B. Also work for contractors who do only masonry work.

C. Some cement masons work for specialty floor contractors.

D. Trades workers are also employed by public agencies and manufacturing firms who do their own construction work.

E. One out of eight cement masons is self-employed specializing in small jobs; a norm that holds true for most of the trowel trades.

1.5 Hiring Practices

A. Workers learn their job on construction sites and assisting cement masons.

B. Workers also learn the trade in two or three year apprenticeship programs.

C. Apprentices receive on-the-job training in addition to a minimum of 144 hours of classroom training each year.

D. Employers prefer to hire high school graduates who are 18 years old and licensed to drive.

1. Consider the ability to work as a team member and to direct others as important assets.

E. Other helpful assets are high school courses in shop, mathematics, blueprint reading and mechanical drawing.

1.6 Wage Scale

A. Current wage scales average above $10 per hour.

B. Apprentices begin at 50% to 60% of the rate journeymen receive.

C. Annual earnings may not be as high as hourly rates indicate.
   1. Poor weather and fluctuating construction conditions lead to unstable employment.

1.7 Common Worker Benefits

A. Unemployment Insurance
   1. Purpose.
      a. transition from job to job.
      b. ease strain of layoffs.
   2. Source of benefits.
      a. payroll tax on wages.
   3. Eligibility.
      a. depends on base year earnings.
      b. depends on reasons for leaving work.

Explain and Discuss
ILS Common Worker Benefits
Invite Field Rep
  Workmen's Compensation Board
  BOL Wage and Hour
  Employment Division

4. Level of benefits.
    a. level of base year earnings.
5. Claims process.
    a. report to Employment Division office.
    b. provide required information.
        (1) employer's name and address.
        (2) your social security number.
        (3) wage earning records.
        (4) current address.
6. Appeals/hearing process.
    a. initiated by worker.
    b. in writing.
    c. within time limits.

B. Wage and Hour Commission
1. Purpose.
    a. to investigate and attempt equitable settlement of wage claims.
2. Areas of claim review.
    a. pay periods.
    b. pay days.
    c. final pay days.
    d. wage payments in cases of dispute.
    e. methods of compensation and overtime.
    f. minimum wage laws.
    g. limitation of hours in certain industries.
    h. restrictions on employment of minors.
3. Jurisdiction.
    a. Federal vs. State.

4. Claim Process.
    a. contact wage and hour commission.
    b. provide required information on appropriate form.
        (1) dates of employment.
        (2) rate of pay.
        (3) reason for non-payment.
        (4) estimate of disputed amount.
    c. wage claim conference.
    d. collection process.
    e. protection against retaliation for filing a claim.
5. Time limits for filing.
    a. regular pay.
    b. overtime pay.

C. Workers Compensation
    1. Purpose
        a. provide medical care payment for on-the-job accidents.
        b. provide time loss payments.
        c. provide payments for permanent disability.
        d. provide death benefits.
    2. Source of benefits.
        a. employer premiums for insurance.
        b. employee contributions.
    3. Level of benefits.
        a. complete for medical costs.
        b. varies according to level of final disability.
    4. Eligibility.
        a. any job-related accident or condition causing the worker to leave work and seek medical treatment.

5. Claim process.
    a. report accident to employer.
    b. fill out claim form.
        (1) know your employer's legal name.
        (2) know your employer's insurance carrier.
    c. see your doctor for treatment.
6. Final determination.
    a. doctor's statement of stabilized condition.
    b. board's findings of disability and payment.
7. Reopening claim for aggravation of injury without a new injury.
    a. contact employer's insurance company if occurs within the first five years.
    b. contact worker's compensation board after five years.

1.8 Trade Terminology

A. Common Trade Terms

1. Admixtures--compounds added to basic compound to change its characteristics/properties.
2. Aggregate--inert particles, usually sand and gravel used in making concrete and mortar.
3. Grout--plaster like compound used to fill joints in tile setting.
4. Hydration--chemical reaction that happens when cement paste hardens, bonding aggregate together in a solid mass.

5. Grade--elevation or height to which you are working.
6. Concrete--mixture of aggregate, portland cement and water which hardens into rock-like mass.
7. Cement--finely ground powder made by burning and grinding limestone and clay. Ingredient used as hardening, bonding agent in concrete.
8. Mortar--plastic mix of cementatious material, fine aggregate and water.
9. Keenes cement--high strength white gypsum gauging plaster.
10. Dry pack--leveling base material used in the setting.
11. Lath--base material for plaster. gypsum board, metal and wood are common materials for lath. Used to provide bonding strength.
12. Gypsum--processed gypsum rock. Generally fine white powder form.
13. Rodding/striking off/screeding--straight edge pulled across material to provide even, level surface.
14. Plasticity--ability to be spread, moved about.
15. Air entrainment--capturing microscopic air bubbles in the concrete through additions of special chemical agents.
16. Buttering--placing mortar on masonry unit with a trowel.
17. Bed joint--horizontal layer of mortar on which masonry unit is laid.
18. Head joint--vertical mortar joint between ends of masonry units.

19. Jointing--process of tooling or facing the mortar joints.

20. Bond--patterns formed by exposed faces of masonry units.

21. Nominal dimension--dimension equal to the actual masonry dimension plus thickness of one mortar joint.

22. Double up--when plaster is applied first in a thin coat then immediately a second coat is put over it.

23. Trowel--hand-held tool with metal blade of varying size and shape used to apply material to surfaces or prepare surface finish.

24. Hawk--platform tool used to hold and carry the various mortars.

25. Darby--flat surfaced tool with handle used to float surfaces.

26. Kumalong--long handled tool used to spread and distribute concrete.

27. Serrated trowel--trowel with serrated edge used to spread mastic/adhesives.

28. Screeds--wood lattice device used as thickness guide for applying materials to surfaces.

2.0 Diagnostic Testing/Trowel Trades

INSTRUCTIONAL OUTCOMES: The Student will complete a Specific Aptitude Test Battery (SATB), administered by a qualified examiner and will have the results explained by a qualified examiner.

INTRODUCTION: The General Aptitude Test Battery is a standardized test that has become recognized as the best validated multiple test battery in existance for use in vocational guidance. The tests are used by apprenticeship committees to assist in the screening process for appropriate candidates when apprenticeship openings occur, and to provide individuals with an indication of the probability of their being successful in a particular trade.

Many apprenticeship programs require applicants to have certain aptitudes as demonstrated by passing appropriate tests. For example, the applicant may be required to pass Specific Aptitude Test Battery (SATB) administered by the State Job Service. SATBs test two or more of the following nine general aptitudes: general learning ability (cognitive functioning), verbal aptitude, numerical aptitude, spatial aptitude, form perception (ability to perceive small detail), clerical perception (ability to distinguish pertinent detail), motor coordination, finger dexterity and manual dexterity.

Each battery tests different combinations of these nine general aptitudes because each occupation requires different specific abilities. The following SATB tests and cutting scores are required by the apprenticeship committee for the trade. The student should be aware of the trade requirements and determine how he or she feels about his or her abilities in the tested aptitudes in order to make a career decision.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
2.1 SATB A. Complete exam described below KEY: Trade Occupation Code # for the occupation SATB for the trade = Recommended cutting	

score for the trade
Location of the SATB within the GATB

TROWEL TRADES

A. BRICKLAYER S#107R

Numerical Aptitude = 85
Arithmetic Reason; Book II, Part 6
Computation; Book I, Part 3

Spatial Aptitude = 90
Three Dimensional; Book I, Part 3

Form Perception = 90
Tool Matching; Book II, Part 5
Form Matching; Book II, Part 7

Motor Coordination = 85
Mark Making; Practice, Part 8

	Cutting Scores		
	Adult	Grade 10	Grade 9
Numerical Aptitude	80	75	74
Spatial Aptitude	85	84	82
Motor Coordination	80	74	68

B. CEMENT MASON S#215

Numerical Aptitude = 70
Arithmetic Reason; Book II, Part 6
Computation; Book I, Part 3

Spatial Aptitude = 70
Three Dimensional; Book I, Part 3

Manual Dexterity = 85
#9 Place, #10 Turn, Board

	Cutting Scores		
	Adult	Grade 10	Grade 9
Numerical Aptitude	80	75	74
Spatial Aptitude	95	94	91
Manual Dexterity	85	79	76

C. TILE SETTER S#112

Form Perception = 70
Tool Matching; Book II, Part 5
Form Matching; Book II, Part 7

Finger Dexterity = 70
#11 Assembly, #12 Disassemble, Board

Manual Dexterity = 80
#9 Place, #10 Turn, Board

	Cutting Scores		
	Adult	Grade 10	Grade 9
Form Perception	75	70	66
Finger Dexterity	80	75	72
Manual Dexterity	80	74	71

D. PLASTERER - Information already listed under #4. DRY WALL/PLASTERER.

B. Discuss Results:

2.0 Diagnostic Testing/Dry Wall/Plasterer

INSTRUCTIONAL OUTCOMES: The Student will complete a Specific Aptitude Test Battery (SATB), administered by a qualified examiner and will have the results explained by a qualified examiner.

INTRODUCTION: The General Aptitude Test Battery is a standardized test that has become recognized as the best validated multiple test battery in existance for use in vocational guidance. The tests are used by apprenticeship committees to assist in the screening process for appropriate candidates when apprenticeship openings occur, and to provide individuals with an indication of the probability of their being successful in a particular trade.

Many apprenticeship programs require applicants to have certain aptitudes as demonstrated by passing appropriate tests. For example, the applicant may be required to pass Specific Aptitude Test Battery (SATB) administered by the State Job Service. SATBs test two or more of the following nine general aptitudes: general learning ability (cognitive functioning), verbal aptitude, numerical aptitude, spatial aptitude, form perception (ability to perceive small detail), clerical perception (ability to distinguish pertinent detail), motor coordination, finger dexterity and manual dexterity.

Each battery tests different combinations of these nine general aptitudes because each occupation requires different specific abilities. The following SATB tests and cutting scores are required by the apprenticeship committee for the trade. The student should be aware of the trade requirements and determine how he or she feels about his or her abilities in the tested aptitudes in order to make a career decision.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
2.1 SATB A. Complete exam described below: KEY: Trade Occupation Code # for the occupation SATB for the trade = Recommended cutting	

score for the trade

Location of the SATB within the GATB

DRY WALL/PLASTERER S#240

Numerical Aptitude = 80

Arithmetic Reason; Book II, Part 6

Computation; Book I, Part 3

Form Perception = 85

Tool Matching; Book II, Part 5

Form Matching; Book II, Part 7

Manual Dexterity = 100

#9 Place, #10 Turn, Board

	Cutting Scores		
	Adult	Grade 10	Grade 9
Numerical Aptitude	85	80	79
Spatial Aptitude	95	94	91
Finger Dexterity	80	75	72

B. Discuss Results:

3.0 Survival Skills/ Trowel Trades

INSTRUCTIONAL OUTCOMES: The student will learn and practice fundamental concepts in: a) dealing with expectations, b) communication skills, c) giving and receiving feedback, d) dealing with interpersonal conflict, e) group problem-solving, goal-setting and decision-making, f) outside influences and responsibilities, g) identifying individual strengths, h) appropriate work habits and attitudes, and, i) phases of job search and worklife.

INTRODUCTION: Training and proficiency in human relations skills are essential for successful adaptation to worklife. All too often in job preparation programs, these basic survival skills are neglected or put aside in favor of training in the technical aspects of work.

This topic describes the many skills necessary to become a stable, productive and satisfied worker.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
3.1 Expectations A. Predicting the future 1. Self-fulfilling prophecies a. setting yourself up for failure b. thinking positively	ILS Survival Skills-Expectations PREPARATION Be familiar with the material beforehand, and think up some relevant examples AVAILABILITY Be available to students. Go around those students reading the material. Be prepared to answer and ask questions that increase students' understanding.

	ELICIT RESPONSE Ask individuals what they would like to do most of all. Use their reply even if it seems trite. Suggest two alternative possibilities--the worst and the best. Ask how each would affect that student's feelings and behavior at this moment.
B. Two-step process to opening up expectations. 1. Being idealistic and realistic a. being creative and having ideas	RELEVANT COMPARISONS Illustrate creativity from movies, TV or writing. Tell the beginning of a story and ask for suggestions on how it might end. Give the original writer's version. Show how anything is allowed in creative ideas.
b. keeping close to the facts	Suggest students read court reports or news coverage.
c. effects of leaving out one of the two steps.	STUDENTS' EXAMPLES Encourage extreme examples of fantasy and of sticking close to the facts.
d. combining the two	
C. Prejudice about other groups.	EXAMPLES OF PREJUDICE Show how stereotypes arise out of stereotyped expectations.
D. Being a winner	ROLE MODEL Be heard thinking positively. Encourage positive thinking in students.

E. Self-Assessment--looking at common personal expectations	IDENTIFY PROBLEM AREAS Go through questions to see where students are putting themselves down. Give encouragement. Ask what they want to change.
F. Post Assessment	EXPLAIN Read through examples, answer questions. FLEXIBILITY Allow students to demonstrate their understanding in less than suggested number of situations.
3.2 Communication Skills A. Good communication 1. two-way process 2. importance 3. innate abilities 4. showing mutual respect	ILS Survival Skills-Communication Skills. PREPARATION Be familiar with the material. BEING A ROLE MODEL Demonstrate active listening. Ensure that students voice problems and doubts. Allow frequent opportunity for students to give responses to on-going work. Be ready to demonstrate bad examples of listening, to group or individuals, and contrast with good examples.
B. Active listening. 1. Centering attention on the other person. a. being seen to be listening b. finding out what is important to the other person c. following the other person's lead d. listening to feeling 2. Checking that you have understood what the other person is communicating. a. checking feeling	

b. checking content c. when it is inappropriate	
C. Being listened to. 1. Your rights as an individual 2. When to keep quiet 3. Avoiding being aggressive 4. A three-step approach a. showing you understand b. taking responsibility for your own feelings c. suggesting alternatives	ASSERTIVENESS Draw examples from books on being assertive. Think up appropriate examples in work context. Discuss aggressive responses with individuals. Describe alternative approaches. Discuss possible exceptions--where aggression might be appropriate.
D. Overall importance of respect for individuals 1. Communication between equals	INSTRUCTOR/STUDENT RELATIONS Assess relations in class in terms of respect for, and equality of, individuals. Ask students for comments.
E. Self-Assessment 1. How individuals communicate with others	IDENTIFY PROBLEM AREAS Give help and encouragement. Find out from students what skills they want to practice.
F. Practicing the skills in triads 1. Active listener of personal experience 2. Role play being listened to	TRIADS Form triads (trios) as students finish Self Assessment. FEEDBACK Listen to one example of active listening in each triad. Give suggestions for improvement. Be open to alternative situations for the role play. Ensure students are willing to practice being sensitive to possible reluctance and shyness. Be prepared to role play yourself.

3.3 Giving and receiving feedback

- A. Importance of being able to give praise and criticism (introduction).
- B. Importance of group support and teamwork
  - 1. Being a team member
  - 2. Building a team
    - a. knowing where you are
    - b. pulling your weight
    - c. responsibilities for others
    - d. group aims and goals
  - 3. Poor working environments
    - a. indirect communication
    - b. not knowing where you stand
- C. Reading attitudes
  - 1. Hired or fired?
  - 2. How do you come across to other people?
  - 3. Interpreting other people's behavior
- D. Giving and receiving positive opinions
  - 1. Importance of praise
  - 2. Taking compliments
  - 3. Giving praise
- E. Getting and giving criticism
  - 1. Its importance
  - 2. Being criticized
  - 3. Avoiding being threatened
  - 4. Between equals
- F. Self Assessment-Feelings and Preferences

ILS Survival Skills-Giving and Receiving Feedback

PREPARATION

Be familiar with the material and prepared to participate actively and equally.

FACILITATION

Facilitate continuously the building of group support. Give extra support to students who have difficulties participating fully. Enlist help of more confident and verbal to share the responsibility. Give support, but principally be a neutral chairperson or facilitator. Encourage group members to observe each others' non-verbal behavior between class times.

POSITIVE REINFORCEMENT

Give frequent verbal praise to individuals who are working well and to the group as it becomes more supportive

MONITORING

Walk around and ask permission to join in some partner discussions. Encourage greater depth. Avoid any judgments. Use paraphrase

	and feeling as checking skills.
G. Assignments 1. Telling individuals what you like	A DEVELOPING PROCESS Introduce when group is ready. First three assignments could be practiced even before module has been read. Explain, in turn each assignment to whole group. Deal with worries, doubts or questions before you begin.
2. Reading attitudes within the group. 3. Opening self-sharing important experiences	Use all your facilitating skills. Especially be sensitive to members' non-verbal responses. Follow up, after the class, on any individual who is upset. At all times encourage positive support within the group. Be prepared to intervene if criticism becomes too negative.
4. Receiving direct positive feedback 5. Receiving direct positive and negative feedback	
H. Post Assessment	Organize small groups or lead discussion of whole group. Use small groups to extend each individual's range of interactions.
3.4 Dealing with interpersonal conflict	ILS Survival Skills-Dealing with Interpersonal Conflict
A. Consequences of poor interpersonal relations	PREPARATION Be familiar with the material and ready to supply further relevant examples from the

B. Recognizing conflict in a work context
  1. Open arguments
  2. Possible causes
  3. Consequences
C. Them and Us atmosphere
  1. The conditions you deserve
  2. Whose responsibility?

D. Unproductive ways of solving conflict
  1. Finding someone to blame
E. Productive ways of solving conflict
  1. Taking responsibility for doing something about it
    a. when people feel threatened by you
    b. when you feel threatened

F. Remaining passive.
  1. Poor working conditions
  2. Physiological and psychological problems
  3. Irrational fears
    a. fear of not being liked
    b. fear of hurting others
G. Action model for solving interpersonal conflicts
  1. Choosing the best time
  2. Taking responsibility for your feelings

world of work.

BE AVAILABLE

Encourage students to comment and question points as they arise. Ask them to come up with their own examples, either confirming or disconfirming the information.

RESPONSIBILITY

Throughout Survival Skills, individual responsibility is repeatedly stressed. Periodically, reassess your own role. Avoid being pushed into the "expert" stance. Try to be an impartial facilitator, encouraging student's learning without passing judgments. Ensure students take responsibility for what they want to achieve.

3. The four-step language formula. a. tell the other person that what he or she is doing is upsetting you b. speak your feelings c. describe how his or her behavior is affecting you d. suggest an alternative H. Negotiating 1. Give and take 2. Compromise	
I. Discrimination and prejudice 1. Different types 2. Dealing with it	IDENTIFY IMPORTANT GROUP ISSUES Deal in a neutral manner with examples of discrimination. Ask individuals for personal experience of racial and sexual prejudice and discrimination. Facilitate discussion on Equal Opportunity and Affirmative Actions. Invite solutions to problems from group members.
J. Self Assessment	NEW ISSUES Be aware of any controversial issues that arise during the Self Assessment. Introduce them to the group for general discussion.
K. Assignments 1. Sharing in small groups.	ORGANIZE GROUPS Form groups as students finish writing. Limit talk to five minutes on each topic. Maintain some urgency by announcing the five minute intervals.
L. Post Assessment 1. The formula	COLLECT WORK Read and make encouraging

2. Personal examples	written comments. Arrange contract for completion of work with any students who produce low standard work.
3.5 Group Problem Solving, Goal Setting and Decision-making A. 10-step model 1. Define the problem 2. Look at the known facts a. what is happening b. who is involved c. when does the problem occur d. where does it occur e. why has it become a problem 3. Agree on your goals 4. Pool ideas for achieving your main goal without evaluating them 5. Look more closely at some of the more interesting and unusual ideas 6. Include any other ideas that you think might be helpful 7. Agree on some guidelines for achieving your goal a. be specific about minimum behavior required 8. Decide on a plan to implement your proposed solutions 9. Assess the likelihood of success 10. Evaluate the success of your decisions after they have been implemented.	ILS Survival Skills-Group Problem Solving, Goal Setting and Decision-Making PREPARATION AND MATERIALS Know the 10-step model without having to refer to it on the page. Work through the process beforehand. Have photocopies of the model. Have ready one large newsprint pad and one marker for every five students. Choose about six examples of unusual tools or materials that students are unlikely to have seen. Have them ready, but hidden. Get advice from specialists beforehand. AVAILABILITY Go around students in class while they are reading material. Help them understand the 10 steps.
B. Self Assessment	CHECK LACK OF UNDERSTANDING Look over individuals' answers. Give help for misunderstandings.

C. Assignment in small groups 1. Producing quality of ideas 2. Practice in thinking creatively	MATERIALS REQUIRED Sheets of newsprint and sufficient markers
	ARRANGE GROUPS During these assignments, there may be laughter and a lot of excited talk. Encourage composition of groups on basis of who works well together rather than primary friendships. Keep groups separated by space. Go around groups, sit in and participate. Keep up speed of work by giving limited time to gather ideas. Invite spokesperson from each group to report back on ideas. Write down ideas as they are given and summarize range of proposed solutions.
3. Identifying unusual objects.	OBJECTS REQUIRED Supply one object for each group. Choose trade tools or materials that most students are unlikely to have used.
4. Quality circle	MONITOR PROGRESS Encourage written records of proposed solutions. Ensure all members of each group take some responsibility for finished product. If possible, get results typed out so they can be shared within larger group.

D. Post Assessment	PREPARE HANDOUT Have copies of 10-step model. Make sure students check what they have written and correct it. PERSONAL EVALUATIONS Invite students to read out or tell others what they wrote under 2 in the Post Assessment.
3.6 Wider influences and responsibilities A. Relations with people in authority 1. Formal workplace a. job titles b. hierarchy 2. Informal workplace a. unwritten rules and unstated expectations 3. Showing respect and being relaxed	ILS Survival Skills-Wider Influences and Responsibilities PREPARATION Be familiar with the module and gather useful newspaper cuttings, brochures and leaflets that illustrate the range of possible influences on somebody settling down to work BE A READY RESOURCE Give examples informally to students from personal experience to back up information. DRAW ON STUDENTS' EXPERIENCE Encourage individuals to think of relevant illustrations from their own experience in a work setting.
B. Relations with family and friends 1. Changes in responsibilities 2. Affects of changes on old relationships a. being prepared b. communicating problems 3. Planning quality time a. keeping work problems at work b. maintaining relationships	

    4. Keeping up leisure activities
    5. Home problems at work
        a. leaving problems at home
        b. serious problems
C. Other influences
    1. apprenticeship
    2. union
    3. social organizations
    4. other workers
    5. state and federal agencies
D. Self Assessment
E. Assignment
F. Post Assessment

SUPERVISION

Ask students to show their answers to the Self Assessment. Since it is a test of comprehension, follow up on any difficulties revealed.

CHOOSING PARTNERS

Encourage students to work with someone different each time. After majority of students have completed assignments, hold a report-back session with whole group. Ask students to summarize and draw conclusions from reports given.

DEMONSTRATE

Show what is required by illustrating it on a chalkboard.

3.7 Identifying and developing individual strengths	ILS Survival Skills-Identifying and Developing Individual Strengths
A. Evaluating yourself and others 1. Expectations 2. Personal theories a. predicting b. controlling	PREPARATION Work through module beforehand. Acquaint yourself with any areas that might cause difficulties in understanding. Make extra copies of exercise sheets. Refer to ILS Expectations.
B. Identifying personal values 1. Significant role models	AVAILABILITY Be at hand throughout this module. For students to discover significant things about themselves, instructions must be followed closely. Ensure that students have had a personal relationship with each of people listed in right column. Ask them to put names they used to address these people.
2. Eliciting personal constructs	Check students' understanding of procedure. If necessary, go through method with whole group. Ensure that the description is of importance to each student and not superficial, such as hair color, etc.
3. Bi-polar nature of constructs	Stress that there is no correct answer; it is important for each person to write what seems opposite to him or her personally regardless of what anyone else might say.

4. Identifying important personal values	ARRANGE PARTNERS Go around and offer interpretations if requested or encourage students to draw conclusions. Ask what they recognize and what is new.
5. Evaluating yourself. a. as you feel you are b. as you would like to be c. looking at the amount of congruity	DISCUSS WITH INDIVIDUALS OR SMALL GROUPS Be tentative about what is identified. The conclusions can only be significant if the individual finds them significant. Use words and phrases such as..."it seems...," "you may..." "I would guess...." "it might indicate.." Use grid to prompt questions rather than answers.
6. Evaluating significant others a. comparing ratings	IN PARTNERS Suggest each student in turn tries to describe what people the other one might like and what people he or she might not like, based on the constructs on paper.
C. Influences on personal decisions 1. How much are you in control of your own life? 2. Positive and negative influences. a. other people b. aspects of self c. organizations	Ensure that students follow instructions closely. Encourage them to search for all influences. If they have difficulty, suggest situations where students make choices, e.g. career, friends, classes, out-of-school activities.

D. Time management 1. Organizing skills 2. Being responsible for your own life 3. Prime time 4. Making a time chart a. procedure b. interpretation	EXTRA COPIES Have ready prepared extra copies of time chart Ensure agreement on completing time chart. Go over method of calculating actual time. Illustrate on chalkboard or newsprint paper; give example of one day's record. Use tally system. CHECK STUDENTS' UNDERSTANDING Do this before anyone starts recording. It might be advisable to go over procedures one day ahead and practice be done in class.
E. Post Assessment 1. Personal values 2. Influences 3. Use of time	Collect, read and hand back during class. Give encouraging comments.

3.8 Worksite Visits

A. Building realistic expectations
  1. Questioning job descriptions
  2. The human side of the job
  3. On-the-job visits
  4. Talking with people in the trade

B. Group visits
  1. Exposure to different working environments
  2. Practice in observation
  3. Asking questions

C. Individual visits
  1. After working hours
  2. Interviewing the worker
  3. Arranging the visit

D. Self Assessment-Comprehension

E. Assignment
  1. Looking at Help Wanted ads

ILS Survival Skills-Finding a Job
Worksite Visits

PREPARATION

Arrange with any company that allows it a group visit during working hours.

Have sufficient copies for use by whole class of Help Wanted ads from local newspapers.

Become an informed source of possible contacts for student interviews with journeymen and apprentices.

CHECK UNDERSTANDING

Ensure students comprehend all of the material before making any contacts or visits.

HELP WITH ASSIGNMENTS

Supply Help Wanted sections--one to each student. Suggest they read through and circle in ink interesting ads. Stress importance that each works on his or her own; it is practice in looking for jobs. Collect what students write and report back

	to whole group with summary of students findings.
2. Writing realistic job descriptions.	Read and comment on students' descriptions. With individual's permission, read out selection to whole group and invite comparisons with job descriptions in newspaper.
3. Contacting a journeyman or apprentice	Supply names and encourage students to come up with own contacts. If necessary, two students could team up to make a visit. Role play telephone contact and get students to copy out suggested questions. Make individual contract with each student, setting deadlines to call, to visit and to report back. Check on progress and share with rest of group.
4. Asking questions	Arrange for individuals to report back to whole group at same session.
5. Making a group visit	Go over observations and questions beforehand. Ask students to write questions down. Divide questions, and order of asking, among group. Add any other questions suggested by group.
6. Reporting back	Ensure that each student records his or her observations. Invite individuals to report on their feelings and findings.
7. Discussion	Lead group discussion on overall findings.

3.9 Resumes A. Nature and function 1. Self advertisement 2. Summary of strengths and skills 3. Different ways to use resumes 4. Contrast application forms B. Extracts from resumes 1. People with little work experience 2. Presenting the best interpretation of the facts C. Suggested format 1. Position desired a. finding out about the job b. matching your skills 2. Education 3. Relevant work experience 4. Other relevant experience 5. Personal data 6. References a. making a list of your achievements D. Identification of your skills 1. Personal and interpersonal skills 2. Skills used in leisure and work activities a. what could go wrong b. what skills you need to avoid mistakes c. stamp collecting d. planting a garden E. A professional finish 1. Typing 2. Paper	Arrange another worksite visit. ILS Survivial Skills-Finding a Job-Resumes PREPARATION AND MATERIALS Large pad of newsprint and sufficient markers for group. Ensure that there are adequate flat surfaces.

F. Cover letter	
1. Why them?	
2. Why you?	
3. Let's meet	
G. Self Assessment	
1. Personal and interpersonal skills	HELPING WITH ASSIGNMENTS Be available throughout, when students are working on Self and Post Assessment. Write on chalkboard further suggestions of personal and interpersonal skills.
2. In a job context	Suggest students help each other in finding relevant examples of their application of skills.
3. Analyze three examples of work	Allow partners to choose each other. Emphasize broad definition of work to include paid and unpaid, part-time, etc. Give examples. Model how students can help each other. Go around and ask questions to elicit relevant information.
H. Post Assessment	Supply sheets of newsprint and markers. Tell students to use the full area of paper. Check that students are recording all the suggested information. Inspect sheets individually and suggest best way to organize data. Advise on where to include or omit dates and which experience to group or
1. Organizing personal work experience	

	separate.
2. Writing a draft resume	Give encouragement and direct help with drafting of resume. Take best draft, type it and duplicate it on quality colored paper. With permission of student, share with whole group. Encourage sharing of draft resumes. Offer to help later if individuals want to develop a finished version of resume.

3.10 Interviews A. Subjective nature of interviews 1. Content of hiring interviews 2. Interviewers' opinions 3. Interviewees' opinions B. Facts and opinions 1. Giving honest opinions 2. Interpreting facts 3. Quoting references and examples 4. Deciding what is relevant C. Employers' expectations 1. Objective measures of aptitude and achievement 2. Appropriate attitudes and work habits D. How to communicate interest and enthusiasm 1. Be genuine 2. Be informed 3. Showing enthusiasm a. non-verbally b. how to speak and what to say E. How to communicate that you will be a good worker 1. Finding examples F. How to show you are trainable 1. School and non-school G. How to show you work well with people 1. Relations with the interviewer 2. Giving examples H. How to be realistic about what you want 1. Knowledge of the work environment 2. Knowledge of the career structure 3. Answering questions about goals	ILS Survival Skills-Finding a Job-Interviews PREPARATION AND MATERIALS Read material beforehand and recall examples from own experience. Have two copies of observers' checklist for each student.

I. Appearance
  1. Clothes
  2. Grooming

J. Non-verbal behavior
  1. Punctuality
  2. Nervousness
  3. Body posture
  4. Gestures
  5. Smoking and chewing

K. Being positive
  1. About yourself
  2. About others

L. Self Assessment
  1. Role play
    a. interviewer
    b. interviewee
    c. observer
  2. List of questions
  3. Checklist

M. Post Assessment
  1. Interview in front of the group
  2. Questions from Joint Apprenticeship Committee
  3. Giving positive feedback

FORM TRIADS

Go through checklist to ensure understanding. Choose best working groups. Keep it moving by limiting time for each role play. Be willing to model positive answers in interviewee's role.

Ask for a volunteer, then allow him or her to select next interviewee. Suggest use of observer's checklist, plus any other positive comments. Give feedback from group and yourself, immediately after each interview. Invite interviewee to share his or her feelings experienced during role play.

3.11 Appropriate work habits and attitudes A. Surviving on the job. 1. Keeping informed	ILS Survival Skills-Finding a Job -Appropriate Work Habits and Attitudes BE A RESOURCE Share personal experience with individuals. Encourage students to ask any older people about work habits and attitudes. Give time for sharing students' findings.
B. Employer's expectations 1. Being punctual and dependable 2. Being honest 3. Being loyal 4. Being willing to learn and able to take criticism	Show relevance of previous modules to both 2 and 3. Ask individuals what expectations a member of Survival Skills class has.
C. Expectations of fellow workers 1. Proving your competence 2. Being reliable and dependable 3. Being a learner 4. Being enthusiastic and interested 5. Being honest and loyal	POSSIBLE DISCUSSION What do individuals expect of friends? What are peer group's attitudes toward 4?
D. Proving your competence to your supervisor 1. High standard of work 2. Keeping a written record of your achievements 3. Showing initiative 4. Taking on responsibility 5. Asking for help	
E. Interference of personal habits 1. Substance abuse 2. Seeking help	Be sensitive to possibility of substance abuse affecting student performance. Learn physical indicators; have referral addresses available.

F. Self Assessment	Check comprehension.
G. Post Assessment	Tell students to repeat reading and doing Post Assessment until acceptable standard is reached. Discuss with individuals any disagreements over appropriate answers and be flexible.

SUGGESTED READINGS:

Alberti, R.E. and Emmons, M.
Your Perfect Right
Impact, 1974.

Blicq, Ron
On the Move: Communication for Employees
Prentice-Hall, 1976

Bolles, Richard N.
The Three Boxes of Life
Ten Speed Press, 1978

Fast, Julius
Body Language
Pocket Books, 1971

Chapman, Elwood N.
Your Attitude is Showing: A Primer on Human Relations
Science Research Associates, 1972

Ford, George A.
Planning your Future: A workbook for Personal Goal Setting
University Associates, 1976

McCay, James T.
The Management of Time
Prentice-Hall, 1977

Nelson, Robert E.
Decision Making
Vision Publishing, 1976

Peale, Norman V.
The Power of Positive Thinking
Prentice-Hall, 1952.

4.0 Trade Math

INSTRUCTIONAL OUTCOMES: The student will complete a diagnostic examination to determine his or her level of math competency, and will receive instruction in those areas of mathematics in which he or she experiences difficulty.

INTRODUCTION: People in every apprenticeable occupation routinely use mathematics in their work. The skilled worker who can perform fast and accurate math calculations can work quickly and efficiently.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
4.1 Math Diagnosis A. Used to test skills 1. Math diagnostic exam, attached, or other suitable exam.	Explain "placement exam" concept Administer exam Grade performance
4.2 Math Remedial A. Used to upgrade skills 1. Modules, as listed, improve performance levels.	Assist student to achieve performance level

ILS	Math--Linear Measurement	
ILS	Math--Whole Numbers Addition Subtraction Multiplication Division	
ILS	Math--Addition & Subtraction of common fractions and mixed numbers	
ILS	Math--Multiplication & Division of common fractions and whole and mixed numbers	
ILS	Math--Compound numbers	
ILS	Math--Percent	
ILS	Math--Ratio and Proportion	
ILS	Math--Decimals Addition Subtraction Multiplication Division	
ILS	Math--Perimeters Areas and Volumes	
ILS	Math--Circumference and Area of Circles	
ILS	Math--Areas of Plane Figures, Volumes of Solid Figures	
ILS	Math--Metrics	

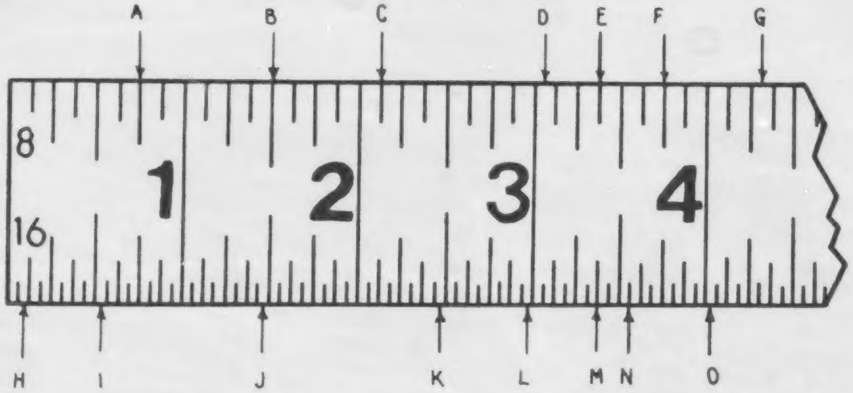
4.0 Trade Math Diagnosis
Placement Test

____
Name

____
Date

1.

Read the distance from the start of the ruler to the letters A through O to the nearest 1/32".



A=________________ F=________________ K=________________

B=________________ G=________________ L=________________

C=________________ H=________________ M=________________

D=________________ I=________________ N=________________

E=________________ J=________________ O=________________

2.

686 + 240 + 1,320 + 16 + 400 =

40 - 16 =

292 X 16 =

180 ÷ 5 =

A contractor buys 400 sacks of rock for three different jobs. On the first job he uses 78 sacks; on the second, 85 sacks; and on the third, 205 sacks. How many sacks does he have left?

A contractor's bid on a school building is $78,265. When one wing is omitted to cut costs, he is able to cut his bid by $16,228. What is his new figure?

3.

If a bundle of rock lath weighs 35 lbs. and it is permissible to place 700 lbs. on any one area on a floor, how many bundles can be placed on any one area?

If 5 lbs. of putty are required to install one light of glass, how many lights can be installed with 85 lbs.?

4.

The improper fraction 48/32 expressed as a mixed number is:

The mixed number 4 3/8 expressed as an improper fraction is:

What is the least common denominator for the following group of fractions: 1/8, 1/2, 1/4, and 1/12?

What is the sum of the following fractions: 7/8, 3/4, and 9/16?

If 3/4 is subtracted from 11/12, the difference is:

The sum of 1 5/8, 2 11/64, and 19 1/4 is:

5.

One roof is 1/3 larger in area than another. The smaller roof takes 24 squares of roofing material. How many squares of roofing material will the larger roof take?

One-third of a box of glass is needed to glaze the north elevation of a building; 2/3 of a box is needed to glaze the south elevation; 1/16 of a box is needed to glaze the east elevation; and 1/2 of a box is needed to glaze the west elevation. How many boxes are needed to glaze all four elevations?

From a bundle containing 101 linear feet of molding, a cabinetmaker uses the following amounts: 11 1/3', 8 3/4', 12 1/8', and 9 5/8'. How many linear feet of molding does he use in all?

6.

The product of 1/2 X 7/8 is:

The quotient of 1/4 ÷ 1/3 is:

If a roll of carpet weighs 467 1/2 lbs. and a running foot of the carpet weighs 2 1/8 lbs., how many running feet are in the roll?

A piece of pipe must be cut to 3/8 the length of another pipe, which is 9' long. How long a piece must be cut?

7.

Write each of the following as decimals.

Seven tenths

Sixteen hundredths

Fifteen thousandths

Eleven ten-thousandths

Two thousand one hundred fifty-two thousandths

Convert each of the following measurements to feet in decimals.

4' 6"

2' 4 1/4"

A house with a floor area of 1,860 sq. ft. is estimated to cost $18,042. What is the cost per square foot?

A stack of plastic sheets measures 2.28" thick, and it is known that the sheets average 0.06" in thickness. How many sheets are in the stack?

8.

The labor cost for the concrete work for a house was $248. The material cost $210. What percent of the total cost of the concrete work was for material?

An architect indicates a 1/8" = 1'0" scale in the drawing of a swimming pool. What is this scale expressed as a ratio?

On a tile job in which fireclay is to be used, a tilesetter tells his helper to mix mortar according to the following formula: 6 buckets of river sand, 1 bucket of fireclay, and 2 buckets of cement. What is the ratio of sand to fireclay in the mixture?

9.

Divide 19' 2" by 3' 10".

How many pieces of 2' 3"-wide gypsum lath will be needed to cover a wall 48' 6" long?

10.

What is the perimeter of a room 20' wide and 30' long?

What is the area, in square feet, of a floor 42' by 42'?

How many cubic yards of dirt have been removed for the basement and foundations of a house if the excavation is 35' long, 35' wide, and averages 5' deep?

The area of a circular putting green with a radius of 17' is how many square feet?

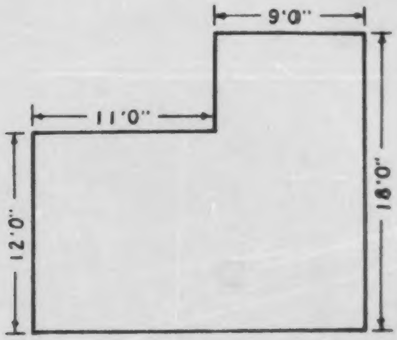
What is the area of a circular floor with a diameter of 10' 6", to the nearest square foot?

What is the area, in square inches, of an acute triangle with a base of 8 1/2' and an altitude of 11 1/4"?

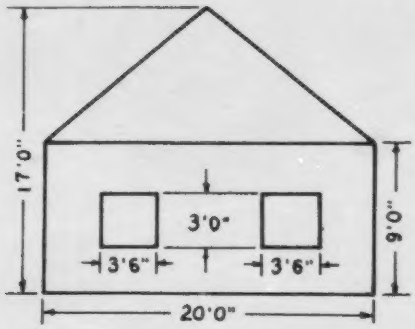
What is the area in square feet, of the floor shown below?

How many cubic yards of concrete will be needed for the foundation walls and footings in the plan below if the walls are 6" thick and 18" deep, and if the footings (shown in dotted lines) will require 2 5/27 cu. yd. of concrete?

1. 6
2. 6 2/3
3. 7
4. 7 1/6



What is the total area, in square feet, of the exterior wall and gable shown below, excluding window areas?



11. Metrics

3 inches = cm

5.4 inches = cm

7 feet = m

3.2 feet = m

6.5 yards = m

15.3 m = inches

12.7 cm = inches

50.8 mm = inches

5.0 Physical Requirements/Trowel Trades

INSTRUCTIONAL OUTCOMES: The student will demonstrate knowledge of physical requirements of the trade and the processes of physical development.

INTRODUCTION: The trade requires certain physical skills and abilities of the worker. It is necessary that the student be aware of the physical demands of the trade and understand factors of physical development.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
5.1 Physical Requirements A. Strength 1. Lifting. a. moving material and equipment weighing 20 to 100 lbs. (e.g. brick and block placement). 2. Carrying. a. material and equipment weighing 20 to 70 lbs. (e.g. boxes of tile) 3. Pushing. a. using ballfloat. 4. Pulling. a. removing forms.	On-site visit or classroom simulation. A. Demonstrate B. Lead discussion or question on job site C. Discuss proper technique D. Administer work sheet

B. Balance
   1. Climbing.
      a. scaffold/ladders to elevated worksite.
   2. Balancing.
      a. on scaffolding with hawk and trowel.

C. Body Dexterity
   1. Stooping.
      a. picking up material.
   2. Kneeling.
      a. cement finishing.
   3. Crouching.
      a. while laying lower course of brick.
   4. Standing.
      a. while plastering walks/ceiling.

D. Manual Dexterity
   1. Reaching above shoulder.
      a. while plastering ceilings.
   2. Reaching below shoulder.
      a. for materials stacked on ground (e.g. bricks).
   3. Handling.
      a. gripping tools and materials.
   4. Feeling.
      a. surface texture of plaster.

E. Talking
   1. Normal communications.

F. Hearing
   1. Normal communications.

G. Vision
    1. Normal vision.
        a. moving about jobsite.
    2. Acuity near.
        a. alignment of materials (e.g. level square).
    3. Acuity far.
        a. overall appearance of finished surfaces.
    4. Color vision.
        a. matching of materials (e.g. color of tiles).

H. Coordination
    1. Hand-arm.
        a. use of tools (e.g. trowels).
    2. Foot-leg.
        a. climbing ladders/scaffolding.

PHYSICAL ACTIVITIES PRESENT IN THE TRADE: REQUIREMENTS (to be completed by student)

STRENGTH	Weight	Frequency	BODY DEXTERITY	Degree of Activ.	Frequency	MANUAL DEXTERITY	Degree of Activ.	Frequency
Lifting			Stooping			Reaching-above shoulder		
Carrying			Kneeling			Reaching-below shoulder		
Pushing			Crouching			Handling		
Pulling			Crawling			Fingering		
BALANCE	Need	Frequency	Standing			Feeling		
			Sitting			TALKING (speech)		Frequency
Climbing			Walking			HEARING	Acuity	Range
Balancing			Reclining					
VISION	Need	Frequency	VISION (Cont'd)			COORDINATION	Degree	Frequency
Normal vision						Hand-arm		
Acuity-near			Color vision			Foot-leg		
Acuity-far			Field of vision			Eye-Hand-Foot		
Depth perception								

5.2 Individual Developmental Processes

- A. Maturation
  - 1. Causes physical changes in height and body proportion.
  - 2. Causes emotional changes.
  - 3. A gradual process.
  - 4. Fluctuates from person to person.

- B. Nutrition
  - 1. Vital to normal growth and development.
  - 2. Essential food groups.
    - a. dairy products.
    - b. meat.
    - c. vegetables and fruits.
    - d. bread and cereals.

- C. Personal Care and Exercise
  - 1. Good grooming habits.
  - 2. Sufficient sleep and relaxation.
    - a. fatigue increases chances for accidents.
  - 3. Hobbies.
    - a. source of relaxation, help to maintain good attitude.
  - 4. Daily exercise.
    - a. stimulates interest.
    - b. relieves stress.

- D. Substance Abuse
  - 1. Marijuana.
    - a. affects nervous system.
    - b. affects thinking, judgment and coordination.
    - c. long-term effects unknown.

ILS Physical Development

Explanation and Discussion

Invite Specialist

2. LSD.
    a. affects chemical level in brain.
    b. produces bizarre mental reactions.
3. Barbiturates.
    a. one of most commonly abused drugs.
    b. slow responses.
    c. physically addicting.
    d. long-term use causes personality disorders.
4. Amphetamines.
    a. affect central nervous system.
    b. commonly abused.
    c. cause psychological dependence.
    d. dull emotions and impair ability to make decisions.
5. Alcohol.
    a. psychologically addicting.

E. Meeting Various Trade Requirements
    1. Recognize and prepare.
        a. natural maturation processes may play role.
        b. exercise will play role.

On-job-site visitations and consultation with occupational therapist.

6.0 Safety

INSTRUCTIONAL OUTCOMES: The student will be able to identify those hazards, acts and conditions which affect safety on the job and will be able to identify ways to avoid or correct them.

INTRODUCTION: A good worker is a safe worker; injury affects production, as well as the ability of a person to earn a living.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
6.1 General Safety	Explain, Discuss and Demonstrate Where Appropriate
A. Average--over 14,000 employees killed each of past several years. 1. From 1960 to 1970 over 150,000 fatalities. 2. Cost, excluding property damage, $11.5 billion. 3. 50 million employee days lost in 1972.	ILS General Safety
B. Accidents 1. An unplanned and unforeseen occurrence that interferes with or interrupts orderly progress of activity.	

2. Should be analyzed to determine why and how happened.
    a. unsafe conditions; poor or defective equipment, poor housekeeping, inadequate lighting.
    b. unsafe acts; loose-fitting clothing; horseplay, removing guards.

C. OSHA
  1. Williams-Steiger Occupational Safety and Health Act, 1970.
  2. Requires employers to provide safe conditions.
  3. Requires employees to comply.
  4. Covers about 60-million people; excludes federal employees.

6.2 Personal Safety

ILS Occupational Safety--
Personal Safety

A. Safety Consciousness
  1. Be aware of good safety practices.
    a. learn the rules.

B. Safety Awareness
  1. Put safety consciousness to use.
    a. obey the rules.

C. Head Protection
  1. 130,000 head injuries in 1976.
  2. Wear clean, adjustable hard hat.

D. Eye and Face Protection
  1. 1,000 eye injuries each day.
  2. Wear safety glasses, goggles, masks; shields if near harsh chemicals.
  3. Wear safety glasses under shields.

E. Hearing Protection
   1. Ear inserts lower high frequency.
   2. Ear muffs lower low frequency.

F. Lung Protection
   1. Mechanical filters protect against non-toxic dust.
   2. Chemical-cartridge types protect against low concentration of some vapors.
   3. Gas masks protect against organic vapers and toxic gases for limited time.
   4. Supplied-air respirators protect against high concentrations of gases and fumes.
   5. Self-contained breathing apparatus protects against high concentrations of gases, vapors, dusts, etc.
   6. Air line respirators protect against high concentrations of dusts, fumes, mists, and low concentrations of gases.
   7. Select proper one for each job.

G. Hand Protection
   1. Average of over 1,300 disabling hand and finger injuries each day in 1976.
   2. Gloves.
      a. asbestos protects against thermal burns, hot or cold.
      b. metal mesh protects against cuts and sharp objects.
      c. rubber protects against electrical and chemical burns.

d. neoprene and vinyl protect against chemicals.

e. leather protects against rough objects, heat and sparks.

f. fabric protects against dirt, abrasions, slivers.

g. coated fabrics protect against chemicals.

3. Creams also used.

H. Foot Protection

1. Over 200,000 disabling foot and toe injuries each year.

2. Wear leather steel-toed safety shoes or boots.

A. Fire Types

ILS Fire Types and Prevention

1. "Class A" of wood, cloth, paper.

2. "Class B" of liquids and gases, paint, grease.

3. "Class C" of energized electrical equipment.

4. "Class D" of metals or metallic dusts.

B. Methods of Extinguishing

1. Absorb heat--add water.

2. Smother--add dry chemicals, foam.

3. Remove fuel--shut off supply.

C. Fighting Classes of Fires

1. Class A

a. water to cool heat.

2. Class B.
    a. CO_2, powder to smother fire.
3. Class C.
    a. non-conducting agent.
    b. attempt to de-energize.
4. Class D.
    a. special extinguishing agent for types of metals.

6.4 Hygiene Safety

A. Exposure to Toxic Materials
    1. Can create health hazards.
    2. Internal exposure.
        a. breathing contaminants.
        b. swallowing contaminants.
        c. absorption through skin.
    3. External exposure.
        a. contact with skin.
        b. can affect senses.

B. Noise Pollution
    1. Measured in decibels.
    2. Can affect hearing over period of time.
    3. Affects other parts of body.
        a. changes size of blood vessels, makes heart work faster.
        b. produces headaches.
        c. negatively affects nerves, decreases powers of judgment.

ILS Occupational Safety--Hygiene Safety

C. Airborne Contaminants 1. Dusts; particles generated mechanically. a. can affect skin, eyes, lungs. 2. Fumes; solid particles of condensation process. a. common fumes caused by oxidation of metal. 3. Mists; particles of liquids or liquids and solids. 4. Gases; low density, change to liquids or solids. 5. Vapors; gases normally in solid or liquid state at room temperature. 6. Contaminants may affect body in four ways. a. as irritants to lungs. b. as asphyxiants, prevent blood from normal transfer of oxygen. c. as anesthetics or narcotics, cause drowsiness and nausea. d. as systemic poisons, attack vital organs.	
6.5 Hand Tool Safety A. Hammers 1. Face should be 3/8" larger in diameter than object. 2. Strike object squarely and flatly. 3. Replace damaged handles before use. 4. Don't strike wood- or plastic-handled chisels. 5. Don't pound with cheek (side) of hammer.	ILS Occupational Safety--Hand Tools

    6. Don't pound sharp objects with mallets

B. Chisels, Punches, Nail Sets
    1. Be sure tools are ground at proper angles.
    2. Remove mushroomed heads.
    3. Hold tools with tongs if being struck by another worker.

C. Screwdrivers
    1. Select correct size and tip style.
    2. Don't pound on screwdrivers.
    3. Don't put hands and fingers under work.
    4. Don't use screwdrivers to pry.
    5. Use appropriate wrench on square-shank screwdriver.
    6. Use magnetized screwdriver to start screws in awkward places.
    7. Use non-sparking screwdrivers if working near explosive hazard.
    8. Use insulated screwdrivers when working on electrical devices.
    9. Don't use screwdriver for electrical testing.

D. Wrenches
    1. Select correct type for job.
    2. Select correct size for snug fit.
    3. Don't use cheater bars.
    4. When using adjustable wrenches, always pull, always against fixed jaw.
    5. Be sure wrench fits squarely, not tilted.
    6. Don't pound with a wrench.

7. Use penetrating oil on "frozen" objects.

E. Pliers
  1. Select correct size and type.
  2. Don't use cheater.
  3. Excessive heat will draw temper from metal.
  4. Don't pound with pliers.
  5. Cutting pliers.
    a. cut at right angle to wire.
    b. point open side down so cut end will not fly out.
  6. Use pliers with high dielectric insulation when working on electrical devices.
  7. Keep jaws clean.

F. Vises
  1. Work as close to vise as possible.
  2. Clamp objects in middle of jaws.
  3. Don't use cheater bar.
  4. Use adequate-sized vise.
  5. Support far end(s) of long work to avoid putting excess strain on vise.

G. Clamping Tools
  1. Select correct size and type.
  2. Keep moving parts clean and lightly-oiled.
  3. Don't over-tighten.
  4. Don't use cheater.
  5. Don't use for hoisting materials.

H. Saws

1. Select correct size and type.
2. Maintain sharpness.
3. Check material before sawing.
4. Use sawhorse or bench, not knee, when sawing.
5. Make sure handle is clean and tight.
6. Be aware of hand, finger and leg position before sawing.
7. Hacksaw teeth should point away from handle to saw on push stroke.
8. Wear gloves when sawing metal.

I. Snips, Shears

1. Select correct size and type.
2. Keep blades sharp.
3. Do not cut wire.
4. Use only hand pressure.
5. Wear gloves.

J. Files, Rasps

1. Select proper size and type.
2. Don't use wood file or rasp on metal.
3. Cut on forward stroke.
4. Keep teeth clean.
5. Use proper sized handles.
6. Don't use to pry.

6.6 Power Tools

ILS Occupational Safety--Power Tools

A. Circular Saws

1. Operate only with fixed guard on upper half of blade and flexible guard on lower half; don't tamper with guards.

2. Blade should clear material by maximum 1/8".
3. Operate by not forcing; forward motion only.
4. Check material for nails, grit, etc.; support material so it doesn't bind.
5. Allow blade to come to full speed before cutting; prevents kickback.
6. Make sure lower guard has returned before setting down.
7. Clean sawdust from lower guard often.

B. Sabre Saws
   1. Select proper blade for material.
   2. Feed blade slowly.
   3. Hold saw base against material.

C. Pneumatic Tools
   1. Secure all hoses.
   2. Clean with compressed air only if less than 30 PSI with guard.
   3. Hoses over 1/2" diameter must have safety valve at source.
   4. Hose couplings must have safety connection.
   5. Nailers should have device to prevent ejecting when not in contact with work.
   6. Point tools toward floor when carrying.
   7. Shut down, turn off air supply, bleed line.
   8. Wear safety equipment, goggles, shields, etc.

D. Hydraulic Power Tools
   1. Fluid used must be fire-resistant and approved by U.S. Bureau of Mines.
   2. Don't exceed manufacturer's pressure recommendations.
   3. Don't touch stream of fluid from leak.

E. Compressors
   1. Storage tanks must be approved by American Society of Mechanical Engineers.
   2. Drain condensed water daily.
   3. Tanks must have safety relief valve.
   4. Pressure gauge must be maintained accurately.

F. Powder-Actuated Tools.
   1. Test before loading each day.
   2. Load just before using.
   3. Wear hearing, eye protection.
   4. Don't point at anyone; keep hands away from barrel end.
   5. Leave protective guards in place.
   6. Must have safety device to prevent accidental firing, and to prevent firing if tilted.
   7. Don't operate near combustion hazard.
   8. Should only be operated by trained and qualified personnel.
   9. Return tool to case after use.
   10. Don't drive fasteners into extremely hard or brittle materials.

7.0 First Aid

INSTRUCTIONAL OUTCOMES: The student will successfully complete an eight-hour multi-media first aid class, taught by a qualified instructor, and will obtain a First Aid Card.

INTRODUCTION: Persons employed in any occupation, especially those occupations which deal with power and hand tools, encounter situations when first aid may be necessary to prevent an injury from becoming more serious. A first aid course, successfully completed, prepares individuals to cope with many of those situations.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
7.1 First Aid A. Eight-hour multi-media course, or equivalent, offered by: 1. Red Cross 2. Medical Services, Inc. 3. Police Department 4. Fire Department 5. Other service and health organizations.	Administer course

8.0 Blueprint Reading

INSTRUCTIONAL OUTCOMES: The student will be able to identify and use the concepts of working drawings and their components: scaling and dimensioning, sketching, orthographic, pictorial and isometric projections, as well as construction symbols commonly found in blueprints.

INTRODUCTION: A skilled worker must understand the language of blueprints to advance in any trade where prints are used.

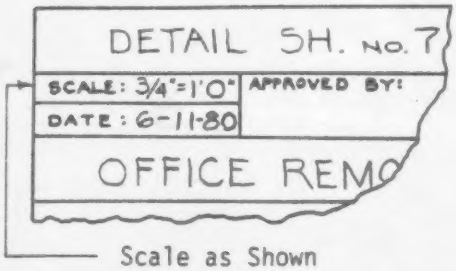
PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS

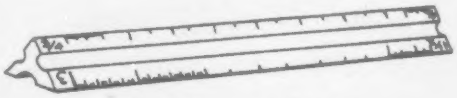
8.1 Scaling and Dimensioning

A. Scale

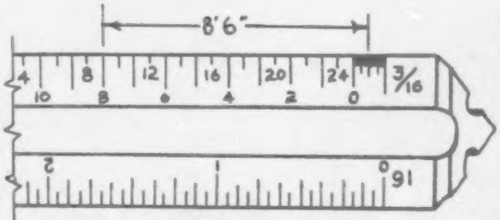
1. The ratio of drawing dimensions to object dimensions.
2. Always indicated on drawing.
3. Vary, depending on size of paper and detail to be shown.
4. Measured by architect's scale, engineer's scale, draftperson's scale.
5. Technique of measurement: architect's scale is placed on drawing, read in marked increments.



Scale as Shown



Architect's Scale



Scale Measurement

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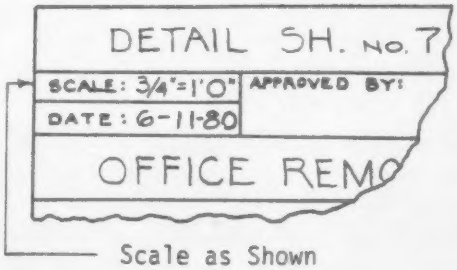
TEACHING METHODS AND AIDS



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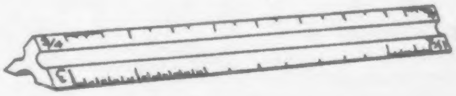
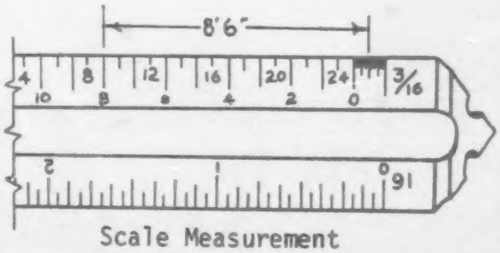
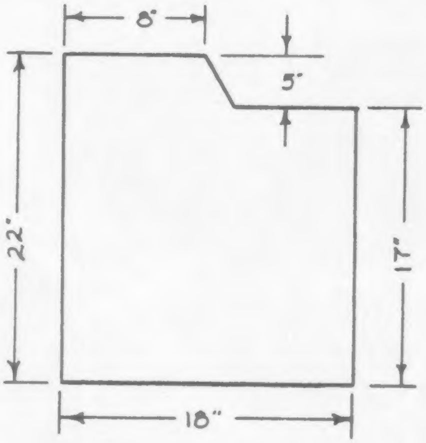


Architect's Scale



Scale Measurement

B. Dimensions
  1. Are size descriptions for drawn objects.
  2. Located on working drawings by:
    a. dimension lines--indicate distance between two points (usually between two extension lines); contain dots or arrows at ends.
    b. extension lines--mark the beginning and end of distance.
  3. Placed in orderly fashion on drawing.



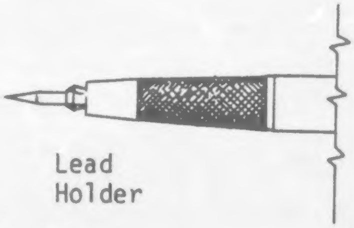
Dimensions

8.2 Sketching

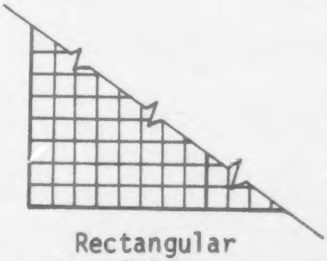
A. Uses
  1. For conveying rough ideas or organizing ideas.
  2. For details, developed from existing drawing.

B. Materials
  1. Pencil, soft lead.
  2. Eraser, gum.
  3. Paper, coordinate.
    a. rectangular grid
    b. isometric grid

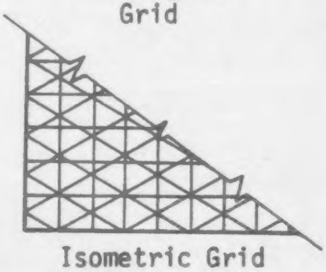
C. Size, Proportions
  1. Generally not drawn to scale, but should remain proportionately accurate.



Lead Holder



Rectangular Grid



Isometric Grid

D. Procedures
  1. Determine overall size of object.
  2. Create short lines by one firm, quick stroke.
    a. go through motion of stroke with pencil removed from paper.
    b. pencil point on paper entire time.

E. Basic Forms
  1. Squares, rectangles, triangles, circles.
  2. Layout crosses (intersecting lines) to provide reference points for drawing.
  3. Circles and arcs sketched with little finger of drawing hand as pivot; move paper, not hand.

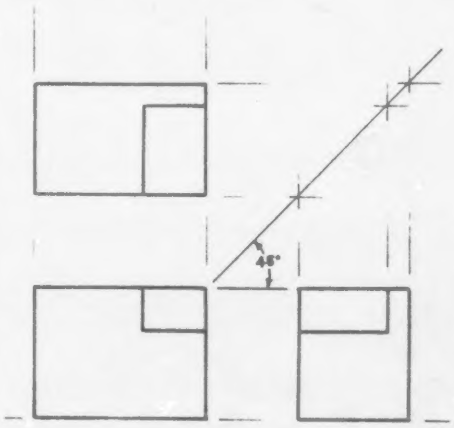
8.3 Drawing Types and Views
  A. Orthographic Projection
    1. Called orthograpic drawings or "true" drawings, also "three-view" or "multiview."
    2. Almost universally used in architect and engineer drawings.
    3. Drawn to scale.
    4. Each view shows one face or side of object as seen from square view.
    5. Possible to indicate true size, shape and location of all object parts, and dimension clearly.

Explain and Discuss:
All References made to:

ILS Scaling and Dimensioning

ILS Sketching

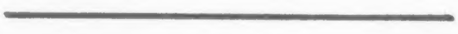
ILS Types of Drawings and Views

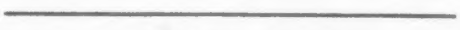


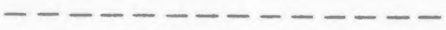
Orthographic Drawing

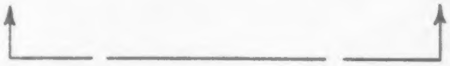
6. Each view is 90° rotation of other view.
7. All related views must be studied together to visualize object shape.

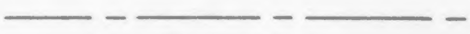
B. Types of Lines
  1. Border Line.
    a. a thick, solid black line (blue).
    b. shows geographical or space borders.
  2. Visible object line.
    a. a thinner solid black line (blue).
    b. shows visible edges of object.
  3. Hidden object line.
    a. a line of equidistant and equal length dashes.
    b. shows edges of important elements hidden from view.
  4. Section line.
    a. a thick, broken line with arrows turned at 90° angle.
    b. delineates sections of object represented.
  5. Center line.
    a. a thin line of alternately long and short dashes.
    b. shows centers of objects (doorways, e.g.) and relationship with given dimensions.


Border Line


Object Line

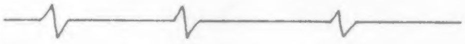

Hidden Object Line


Section Line

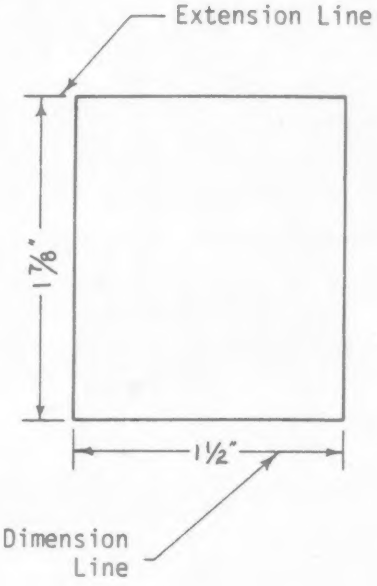

Center Line

6. Long break line.
    a. a thin solid line, straight, with occasional zig-zags.
    b. indicates a break in object.
7. Extension line.
    a. a short thin line, drawn perpendicular to dimension line.
    b. shows beginning and ending point of measurement; lines are extensions of object or part.
8. Dimension line.
    a. a long thin line, with dots or arrows on each end, broken in middle for numbers.
    b. touch extension lines and give measurement from one extension line to another.

C. Pictorial Drawing
    1. Shows more than one face of object.
    2. Advantage: easier for lay person to understand.
    3. Disadvantage: distorted object lines and angles.
    4. Useful to give "completed" look renderings.



Long Break Line

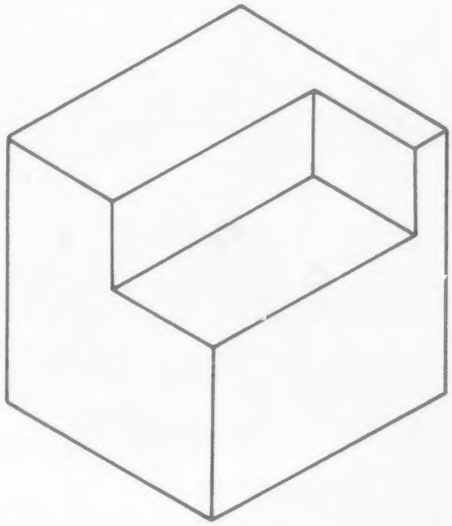


D. Axonometric Drawing

1. A type of pictorial drawing.
2. Three principle axes used.
3. Can represent any object by changing viewpoint.
4. Isometric position is principle one used.

E. Isometric Drawings

1. Viewed from exact position in which three of sides are equally foreshortened.
2. Three axes: one axis vertical and other two at 30° from horizontal base.
3. Will appear in true proportion.
4. Will not appear in true scale lengths.



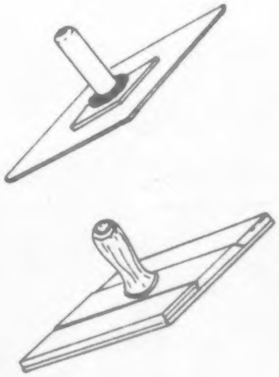
Isometric Drawing

9.0 Tools/Trowel Trades

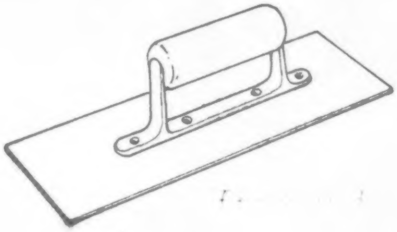
INSTRUCTIONAL OUTCOMES: The student will be able to identify, select and explain the use of tools commonly used in the trowel trades, as well as to demonstrate basic manipulative skills.

INTRODUCTION: Knowledge of the proper tools and their correct use is extremely important to the trowel trades. The right tool will make the job much less work and easier to achieve a professional finish.

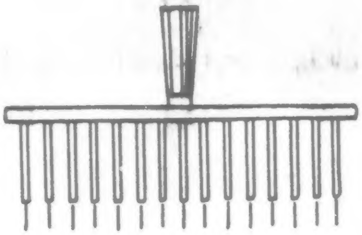
PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
9.1 General Tools 9.1.1 Plastering Tools A. Hawk 1. Metal or wood board forming a platform surface. Usually has bracket for mounting on pole or post, or to be hand-held. 2. Used to hold and carry various mortars and plastic materials. 3. Either hand-held or mounted on support, mortar is placed on hawk to provide easy access.	Explain and Demonstrate Invite Supplier to Demonstrate NAHB (Plastering) op.cit. ILS Trowel Trades Tools 

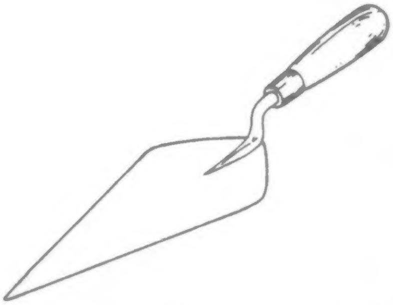
B. Trowel
  1. Metal, shapes and sizes vary according to use.
  2. Used to apply and shape plaster.
  3. Hand-held, remove plaster from hawk, apply to surface and spread.



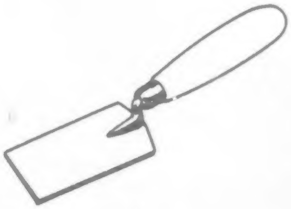
C. Scarifier (Scratcher)
  1. Metal rake like tool.
  2. Designed to scratch surface of unset plaster to improve bonding surface for next coat.
  3. Drawn over surface of plaster coat before plaster has set; roughens surface for better finish coat bond.



D. Pointing Trowel
  1. Pointed metal trowel.
  2. Multipurpose tool, used to clean tools, troweling in spaces large trowel can't reach, using small pats of material and working in mitered corners.
  3. Hand-held, to transfer plaster to work surface and spread plaster.

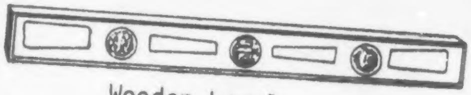


E. Margin Trowel
  1. Square ended metal trowel.
  2. Used to apply plaster in narrow places, clean tools, etc.
  3. Hand-held to transfer plaster to work surface and spread.



F. Spirit Level

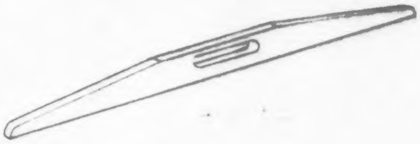
1. Metal or wood, length varies; usually has three or more calibrated vials.
2. Used to check whether a surface is level or plumb.
3. Placed flush against surface, if bubble centers in calibration, surface is level.



Wooden Level

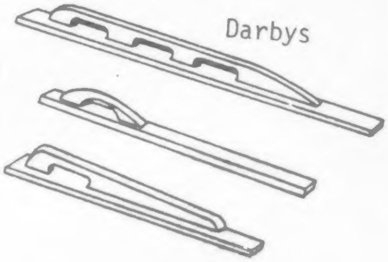
G. Straight Edge (Rod)

1. Wood or metal, length varies, often 5'8" long with straight, true edge.
2. Used to straighten surface of walls and ceilings.
3. Drawn over freshly applied plaster to even out surface irregularities.



H. Darby

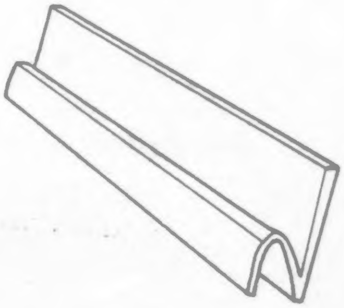
1. Wooden tool, size and length vary; handle on back surface for gripping.
2. Used to float over freshly placed brown mortar coat; compacts and smoothes mortar.



Darbys

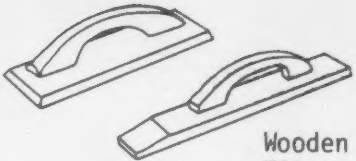
I. Featheredge

1. Metal tool with curved flange edge; lengths vary.
2. Used to straighten corners, finish coat; often used instead of straight edge (rod) to straighten walls and ceilings.
3. Hand-held, drawn over surface to smooth and level surface.



J. Floats

1. Metal or wooden backed and handled tools with various surface materials and surface textures (e.g. cork rubber; smooth, textured).
2. Used to level off the humps and depressions left by other tools' work; compacts material on wall surface; may also produce textured surface.
3. Hand-held, stroked over surface for finished appearance.



Wooden Floats

Rubber Float

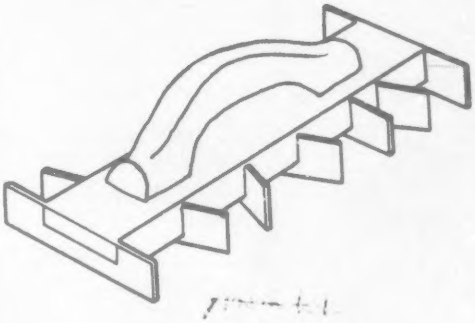
K. Brushes

1. Browning brushes, ideally 6½" X 4" bristle brush; finishing brushes, with bristles or felt type.
2. Browning brushes used to "throw" water on plaster surface to provide slippery surface for tools to straighten and shape plaster; finish brushes used to brush water directly onto surface while final coat of material is applied.
3. Hand-held, use flicking motion for Browning brush, stroking motion for finish brushes.

[illegible]

L. Angle Plane

1. Metal tool with handle; multiple blades set at staggered angles.
2. Used for preparing surface, knocking down high spots, cleaning angles and scraping after brown coat has set.



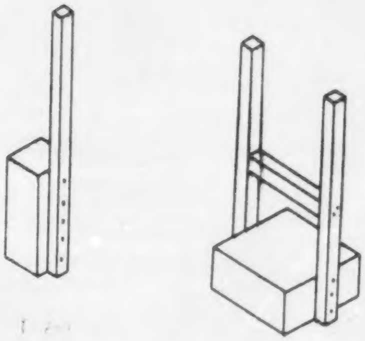
[illegible]

3. Hand-held, use scraping motion to reduce and eliminate surface irregularities.

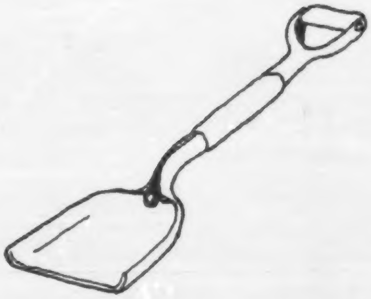
9.1.2 Cement Finishing Tools

NAHB (Cement Mason's) op.cit.

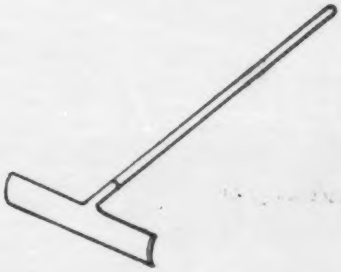
A. Hand Tamper
   1. Flat metal surface with pole type handle; surface area and length of pole/handle varies.
   2. Used to compact earth or fill for subgrade.
   3. Hand-held, surface is driven downward to compact subgrade with plunging motion.



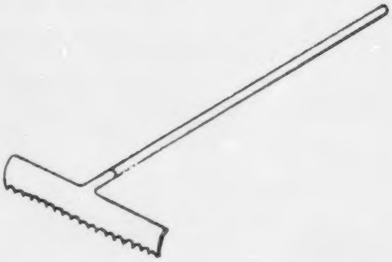
B. Square Nose Shovel
   1. Shovel with flat, rather than pointed blade; various sizes and handle lengths; usually size #2 is selected.
   2. Used to spread and distribute concrete uniformly, for removing soil and roots from subgrade.
   3. Hand-held, blade may be assisted by foot to drive into subgrade.



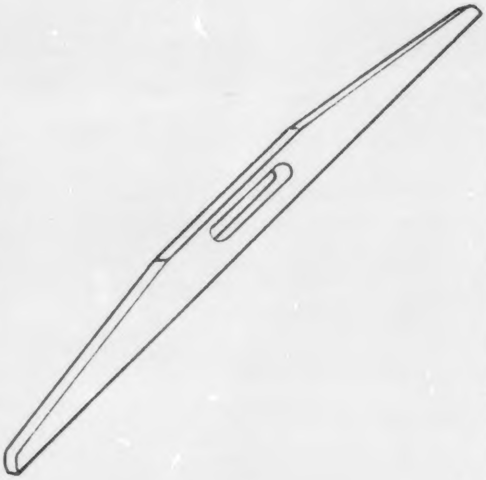
C. Kumalong ("Come-a-Long")
   1. Curved bladed, long- handled tool.
   2. Used for spreading and distributing concrete without segregation.
   3. Immediately after concrete is placed, kumalong is used with raking motion to redistribute concrete.



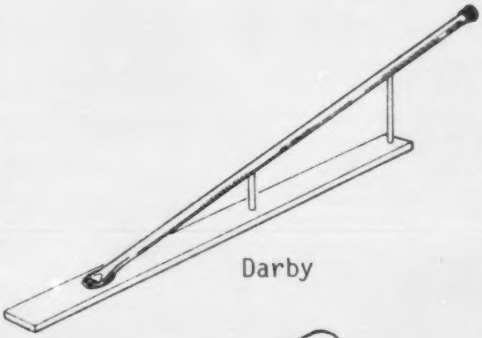
D. Concrete Rake
   1. Similar to kumalong, but has serrated edge.
      a. not a garden hoe or rake.
   2. Used to spread and distribute concrete after placement.
   3. Used in raking motion, like kumalong.



E. Strike/off
   1. Screed, rod and straightedge made of metal or wood (often 2 X 4s); often made on job to suit needs.
   2. Used to level surface immediately after concrete has been spread out in forms.
   3. Drawn over surface using forms as a guide.

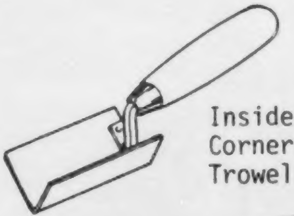


F. Darby
   1. Long and short handled wooden tools with flat surfaces.
   2. Used to level out high and low spots left by straightedge operation; imbeds coarse aggregate; must be used before bleed water collects on surface; useful in confined areas.
   3. Used by drawing or pushing long, smooth strokes over surface.

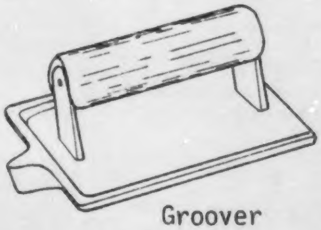


Darby

G. Finishing Tools
   1. Straightedger, radius, corner tools, jointer/groover, trowels. Metal and wooden tools of various shapes and sizes.

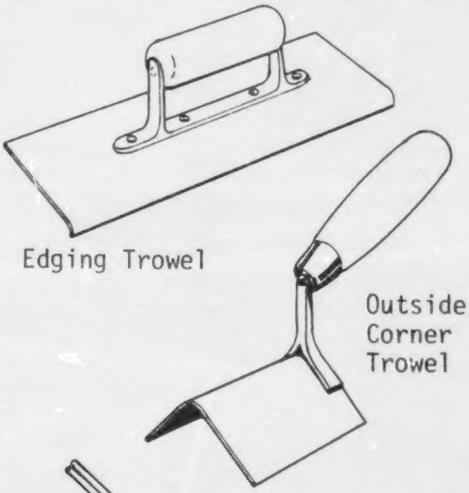


Inside
Corner
Trowel

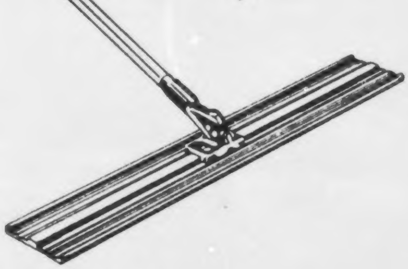


Groover

2. Used to provide neat, rounded edges that help prevent chipping or breaking off; compacts and hardens concrete next to form; used after concrete has been cut away from forms with a trowel and after it has set up so it can hold the tool shape.
3. Hand-held, used with stroking motion.

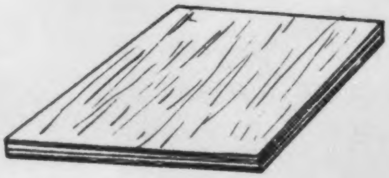


H. Bull Float
1. Long handled, wide-bladed float.
2. Used to eliminate high and low spots left by straightedge; imbeds coarse aggregate.
3. Long even strokes pushed or drawn over surface.



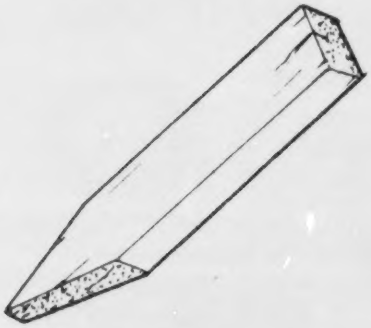
I. Wheel Barrow
1. Metal bed with wooden handles, usually has pneumatic tire; bed size varies.
2. Used to mix and transport concrete.
3. Wheeled by hand using proper lifting techniques.

J. Mixing Board
1. Flat, clean surface of various size and composition.
2. Use as surface for mixing concrete.
3. Place dry ingredients on board, form depression in center, add water and mix toward center.



K. Screed Stakes

1. Stakes used to establish level to which concrete will be poured.
2. Imbedded in level ground to uniform height; concrete pour level is measured against stakes.

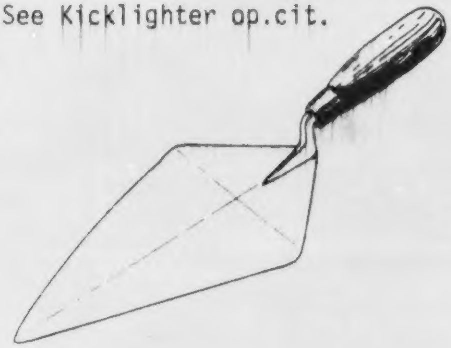


See Kicklighter op.cit.

9.1.3 Bricklaying Tools

A. Trowels

1. Pointed metal blade 9" to 12" long, 4½" to 7" wide with plastic or wooden handles; types are: buttering, gauging, duck bill, cross joint, margin and pointing.
2. Used to transfer mortar from mortar board to brickhead or bed joint.

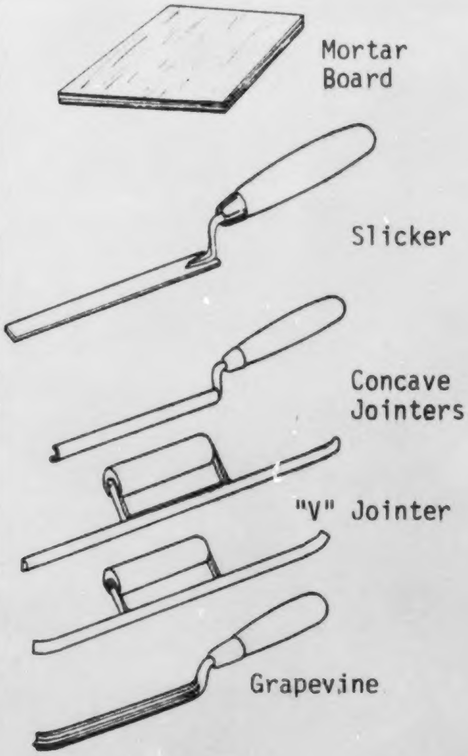


B. Mortar Boards

1. Flat wooden surface.
2. Used to hold mixed mortar close to work.
3. Place board close to work location with mortar centered on board.

C. Jointer/Striker

1. Several types and sizes of metal tools, made of cast or forged rods or stamped metal.
2. Used to finish mortar joints; long, horizontal joints are finished most easily with sled runner styles;
3. Hand-held, rubbed across mortar joint before it hardens.

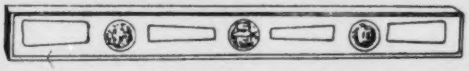


D. Brushes

1. Produced in a variety of shapes and textures.
2. Used to remove mortar from masonry, (wash brick surface with muriatic acid) and for general cleaning.
3. Hand-held, used in a back and forth stroking action.

E. Spirit Level

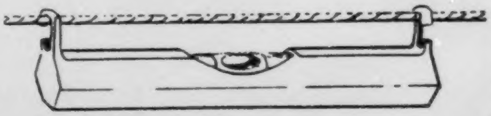
1. Metal or wood measuring devices, length varies; usually has three or more calibrated vials.
2. Used to check whether a surface is level or plumb.
3. Placed flush against surface; if bubble centers in calibration, surface is level.



Spiritlevel

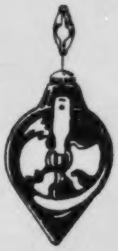
F. Line Level

1. Tube shaped with hooks to hang on a line.
2. used to check level over long distances; e.g. excavation and form setting.
3. After setting line check calibration on vial, if bubble is centered, line is level.



G. Chalkline

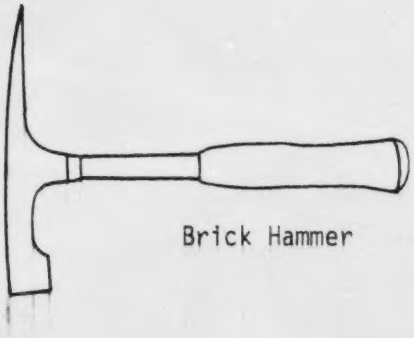
1. String coated with chalk, either open or enclosed reel; chalk is usually red or blue.
2. Used to mark straight lines between two points.



3. Line is stretched across surface between two points, raised from surface and snapped; line mark is a straight line between both marks.

H. Brick Hammer

1. Flat head for striking; other side is drawn out to chisel shape. Handles of wood, fiberglass or metal, with rubber grips; 12 to 24 oz. weight.
2. Used to drive nails, strike chisels and break or chip masonry materials.
3. Hand-held, swing as conventional hammer; use caution to protect eyes.

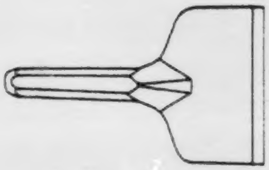


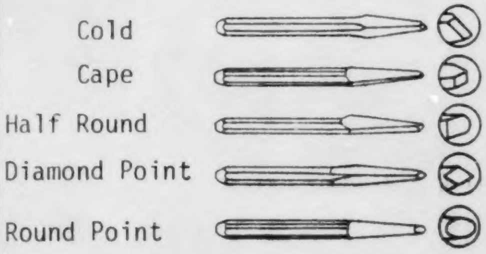
Brick Hammer

I. Chisels

1. Hardened, sharpened steel of various blade shapes.
2. Used to cut and split masonry/stone.
3. Struck with hammer along cutting line.

Brick Chisel

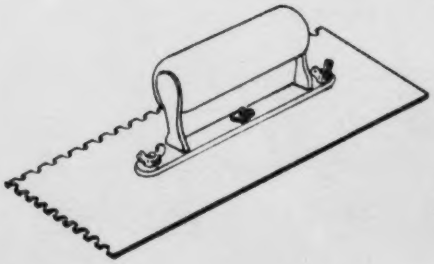




9.1.4 Tile Setting Tools

A. Serrated Trowel

1. Metal blade with serrated edge, metal or wooden handle.
2. Used to apply thinset or mastic.
3. Hand-held, draw across surface, spreading material; use serrated edge to provide textured surface for improved bonding.



B. Margin Trowel

1. Metal, square-nosed blade with wood or metal handle.
2. Used to spread thinset or mastic along borders or edges of work surface.
3. Hand-held, drawn over surface at angle to spread material.

C. Spirit Level

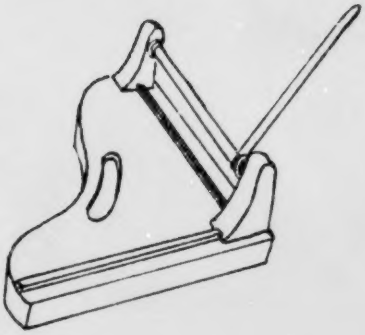
1. Metal or wood body, length varies; usually has three or more calibrated vials.
2. Used to check level and plumb on surfaces.
3. Placed flush against surface, if bubble centers in calibration, surface is level.

D. Builder's Square (Carpenter's or Framing Square)

1. Metal; blade and tongue length varies Accurate calibrations to 1/16" or better featuring precise right angle between tongue and blade; have tables of information on surface.
2. Used to check for squareness of corners, measuring and marking lengths.
3. Used as a ruler for measuring and marking; held up to corner for checking squareness; tongue and blade line up to perpendicular surface without gaps, corner is a right angle (90^0).

E. Tile Cutter

1. Flat calibrated surface with horizontal cutting blade.
2. Used to cut tiles to size prior to installation.
3. Place tile on surface, depress lever, or handle which lowers blade and cuts tile.

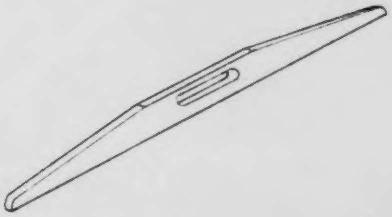


F. Cloth, Sponge, Cheesecloth

1. Used with water to wipe grout from tile face.
2. Wipe in circular motion. Repeat until surface is clean (grout-free).

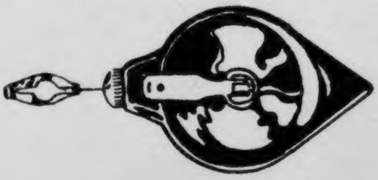
G. Straightedge or Rod

1. Metal or wood of various lengths.
2. Used to level dry pack surface and guide while setting tile on walls or floors.
3. Draw straightedge over dry pack with smooth even strokes; for guide, hold above course being set to gain proper alignment and spacing.

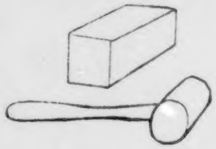


H. Chalkline

1. String coated with chalk; either open roll or enclosed self-chalking reel unit.
2. Used for marking layout for tile.
3. Line is stretched across surface between two points, raised above surface and snapped; chalk mark is a straight line between both points.

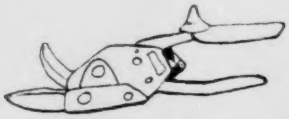


I. Tapping Block and Mallet
   1. Blocks of wood--size varies. Mallets of wood or rubber.
   2. Used to imbed tile into thinset or mastic.
   3. Block is placed on tile and tapped with mallet, or used without mallet.



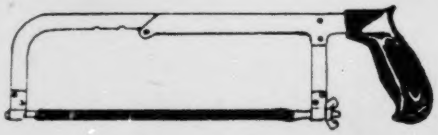
Tapping Block
&
Mallet

J. Tile Nippers
   1. Metal straight blade cutting tool (like scissors).
   2. Used to cut tile to size and shape.
   3. Use scissor cutting motion to cut tile.



K. Saws
   1. Most commonly used are handsaws and hacksaws.
   2. Used to cut wood and metal (hacksaw).

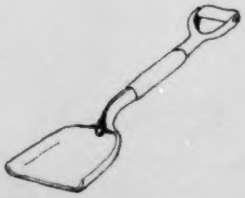
Handsaw



Hacksaw

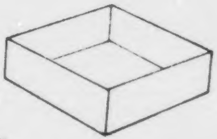
L. Mortar Hoe
   1. Generally wooden handled with metal blade; blade is perpendicular to handle.
   2. Used to mix mortar.

M. Shovel
   1. Wooden handled with metal blade; shape of blade varies as does length of handle.
   2. Used to prepare dry ingredients for mortar.

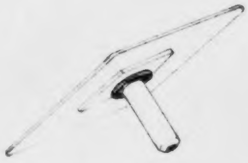


N. Mortar Board
   1. Flat wooden surface.
   2. Used to hold mixed mortar.
   3. Set up in immediate work area.

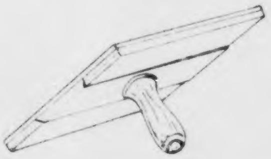
O. Mortar Box
   1. Wooden or metal container.
   2. Used to hold mortar while mixing.



P. Hawk
   1. Metal or wooden board forming a platform surface; usually has bracket for mounting on pole or post, or to hold in hand.
   2. Used to hold mortar while working.
   3. Mortar is placed on hawk to provide easy access during work.

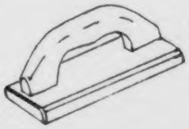


Aluminum Hawk



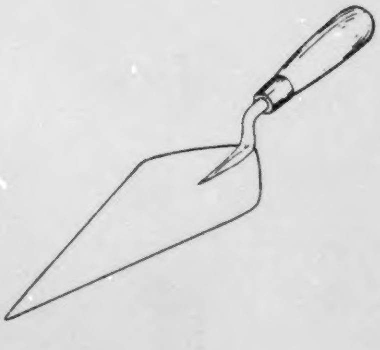
Wooden Hawk

Q. Rubber Grout Float
   1. Rubber base on wood or metal handle; size varies.
   2. Used to surface grout joints.
   3. Float is pressed over tile and grout and moved in circular motions.



Rubber Float

R. Pointing Trowel
   1. Flat metal blade with pointed nose.
   2. Used in places where large trowel won't reach, and for applying small amounts of material.



10.0 Materials/Trowel Trades

INSTRUCTIONAL OUTCOMES: The student will be able to identify and describe types, characteristics and uses of basic materials of the trowel trades.

INTRODUCTION: Careful selection of materials to be used on a job is the key to successful work. Selecting and mixing the wrong materials will invite problems and poor results.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
10.1 General Materials	Explain and Discuss
10.1.1 Plastering Materials	Invite Supplier to Demonstrate
A. Gypsum	
1. Processed gypsum rock.	NAHB (Plastering) op.cit.
2. Dry powder; available in 100 lb. bags.	
3. Used as most common ingredient in interior plastering materials.	ILS Trowel Trades Materials
B. Lime	
1. Processed limestone rock.	
2. Dry powder form; available in 50 to 60 lb. bags.	
3. Ingredients used to provide pliability ("plasticity") and retard drying.	

C. Portland Cement
   1. Product of lime silica, iron oxide and other ingredients.
   2. Dry powder; available in 94 lb. bags.
   3. Common ingredient in concrete, exterior plaster and other plaster subject to moisture.

D. Aggregates
   1. Sand, wood fibers, perlite, vermiculite.
   2. Dry granular or processed fibers.
   3. Used to add bulk and increase coverage; may provide surface texturing characteristics.

E. Plaster Products
   1. Neat gypsum.
      a. base coat plaster without aggregate.
   2. Gauging plaster.
      a. specially ground gypsum with well defined rapid setting properties.
   3. Molding plaster.
      a. finely ground gauging plaster, often used for decorative, detail work.
   4. Keenes Cement.
      a. not cement, but high strength white gypsum, used for finish coat.
   5. Wood fibered gypsum.
      a. neat gypsum with wood fibers premixed, used as scratch coat over metal lath.

6. Finishing limes.
    a. used to provide bulk, plasticity and easier spreading for finish coat.

F. Admixtures
    1. Setting agents, bonding agents, fire retardant substances.
    2. Used to vary setting time of plaster, improve bonding to base or increase fire resistance.

G. Bases for Plaster
    1. Gypsum board lath.
        a. made of special paper with gypsum enclosed.
        b. various thickness and sizes of sheets.
        c. may be perforated to improve bonding.
    2. Metal lath.
        a. made of galvanized steel or wire.
        b. designed to provide the best mechanical bond for plaster.
    3. Welded or woven wire paper base.
        a. absorbent paper with wire interwoven.
        b. often used with machine-applied plaster.
    4. Masonry bases.
        a. cinder block, brick, rock or concrete.
        b. may be used if bonding is assured; may require roughening or bonding agent.

5. Wood lath.
    a. thin strip of wood nailed to frame work; seldom used today.

H. Water--clean; used in varying amounts.

10.1.2 Concrete Materials

NAHB (Cement Masons) op.cit.

A. Cement
    1. Product of lime, silica, iron oxide and other ingredients.
    2. Dry powder; available in 94 lb. bags, has high compression strength but low tensile (stretching) strength; admixtures may be added to change properties (strength, freeze resistance, setting time).
    3. Common ingredient in concrete; must be steel reinforced to provide good tensile strength.

B. Aggregate
    1. Sand, stone and gravel.
    2. Fine, usually sand, ¼" and smaller; coarse, usually rock or gravel larger than ¼"; graded by size.
    3. Used as bulk ingredient in making concrete. Varying size and proportions of aggregate will change characteristics of concrete.

C. Additives
    1. Coloring agents--usually added as dry powder in mixing process to add various colors to concrete.

2. Air entraining agents.
    a. designed to introduce small air bubbles into concrete to improve freeze-thaw characteristics greatly.
3. Hardening agents.
    a. used to provide increased strength characteristics.
4. Setting agents.
    a. used to regulate setting time.
5. Curing agents.
    a. used to regulate hydration process for curing cement.

D. Forms
    1. Wood, metal, etc.; hold wet concrete in desired shape until it sets.

E. Water--clean, used in varying amounts.

10.1.3 Bricklaying Materials

Kicklighter op.cit.

A. Bricks
    1. Manufactured clay masonry or ceramic material; size and shape vary as do color, face and surface texture; size ranges from 3" to 12" thick, 2" to 8" high and lengths to 16" are common.
    2. Used to form solid or hollow walls; may be either load- or non-load-bearing; may be used to provide decorative surface texture or pattern; also used in walks, decks/flooring and fireplaces.

B. Tile--Hollow Clay Tile
  1. Structural clay tile.
    a. load-bearing or non-load-bearing; size 3" to 8" thick (nominal), 5 1/3" to 12" (nominal) high, 8", 12", or 16" long.
  2. Structural facing tile.
    a. glazed--wide range of colors and texture or unglazed; many sizes available in modular dimensions (4" mult.).
  3. Hollow, meaning each unit has net cross-sectional surface less than 75% of its gross cross sectional area (measured parallel to bearing surface); hollow channels may run horizontal or vertical to wall.
  4. Used to construct both load-bearing and non-bearing walls and partitions, decorative screen and wall facing treatments.

C. Blocks
  1. Solid and hollow concrete block available in wide range of sizes and shapes based on a 4" module; glass block available in functional, general purpose and decorative categories.
  2. Inexpensive, good insulation, sound reducing properties, fire resistant; weathers well and highly available; concrete blocks have high compressive strength.
  3. Concrete brick and block used to construct bearing and non-bearing walls and partitions.

D. Stone
  1. Three major groups of natural stones:
    a. igneous.
      (1) granite.
    b. sedimentary.
      (1) sandstone.
      (2) limestone.
    c. metamorphic.
      (1) marble.
      (2) slate.
    d. additonally there is manufactured stone, designed to simulate the appearance of most types natural stone.
  2. Usually irregular in shape; provides highly-decorative surface patterns and textures; slower and more difficult to use than fabricated masonry units, due to irregular shape.
  3. Frequently used as veneer, trim and floor or in paving applications; occasionally used for foundations, exterior walls and chimneys, though less frequently than in past.

E. Mortar
  1. Made of varying proportions of Portland or masonry cement, sand, lime and water, where total aggregate to cement/lime ratio is not less than $2\frac{1}{4}$ and not more than $3\frac{1}{2}$ times volume of cement and lime used; usually greyish in color but may be white or colored by using white cement and pigments for color; mixed for plain or reinforced applications.

2. Mortar properties/characteristic.
    a. workability--has ability to spread easily, cling to vertical surfaces and extrude readily from joints without dropping or smearing.
    b. water retentivity--ability to resist rapid water loss.
    c. consistent rate of hardening--allows laying units and tooling joints to the same degree of hardness.
    d. bond--determined by extent of contact between units and mortar, tensile strength or force required to separate the units.
    e. durability--ability to withstand exposure.
    f. strength--ability to withstand compressive loads exerted on masonry structure.
    f. appearance--uniformity of color and shade.

F. Anchors, Ties and Reinforcements
  1. Types.
    a. metal wire, rod, and formed bars.
  2. Uses and characteristics.
    a. used to provide tensile strength and to tie walls, partitions and other building units together.

10.1.4 Tile Setting Materials

A. Tiles
   1. Wide range available in varying size, color and texture; fall into following major catagories.
      a. white clay back.
      b. porcelain mosaics.
      c. natural clay mosaics.
      d. quarry tile.
      e. soft-backed glazed quarry tiles.
      f. vitrous tile.
      g. glass mosaics.

B. Grouts
   1. Formulated for different applications and appearances.
   2. Major types are:
      a. wall type.
      b. natural cement.
      c. pre-mixed color.
      d. sanded.
      e. non-sanded.
      f. epoxy.
      g. furnane grouts.
   3. Used to fill joints between.

C. Mortars
   1. Designed to provide level, intermediate surface on which tile is bonded.
   2. Two major types.
      a. wall type.
      b. floor type.

D. Mastics
   1. Provide for adhesion between tile and subsurface.
   2. Formulated in a wide variety of types to provide specific properties for different types of application and/or tile being used.
   3. Major types:
      a. wall mastic.
      b. floor mastic.
      c. thinset mastic.
      d. epoxy mortar.
      e. acrylic thinset.
      f. latex mortar.

E. Sealers
   1. Designed to protect tile surface.
   2. Categories.
      a. wax.
      b. acrylics.
      c. latex.
      d. solvent base.
      e. silicone.
      f. emulsion.
   3. Follow manufaturer's directions for application.

F. Screeds
   1. Wood lattices.
   2. Used to provide leveling guide when applying mortar.

11.0 Trowel Trades Processes

INSTRUCTIONAL OUTCOMES: The student will be able to describe and execute the tasks and processes of work accomplished in the trades.

INTRODUCTION: The skilled worker must be able to identify the proper steps to perform in order to satisfactorily complete a project. Proper execution of all required tasks will result in an efficient and professional job.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
11.1 General Processes	Explain and Discuss
11.1.1 Plastering Processes	Jobsite Visitation
A. Site Preparation	
1. Check site for proper inspection certification (specially base material).	ILS Trowel Trade Processes
2. Perform visual check for level, plumb and square/true corners.	
3. Review plans and specifications.	
B. Select Type of Plaster to be Used	
1. Determined by base material and plan specifications.	

C. Set Dots and Screeds in Base Material

D. Mixing Base Coat Plaster

1. Determine proportions required.
2. Determine whether mixing by hand or mechanical mixer.
    a. hand method.
        (1) place ingredients into one end of mixing box (called "charging the box").
        (2) use layering technique (add part of each material in layers to aid in mixing.
        (3) use mortar hoe to "chop" dry materials in order to mix thoroughly.
        (4) add small amounts of water and continue chopping dry ingredients into water.
        (5) continue adding water until thoroughly mixed (use caution to add no extra water, as this will weaken plaster and cause cracking of surface).
    b. mechanical mixer (preferred method).
        (1) add nine-tenths of water to clean mixer (any old plaster will act as accelerators to new plaster mix).,
        (2) add half of the sand.
        (3) add all of the plaster.
        (4) add rest of the sand.
        (5) add any admixture to be used.
        (6) mix not less than half minute or more than three minutes (based on mixer speed).

(7) dump entire batch.

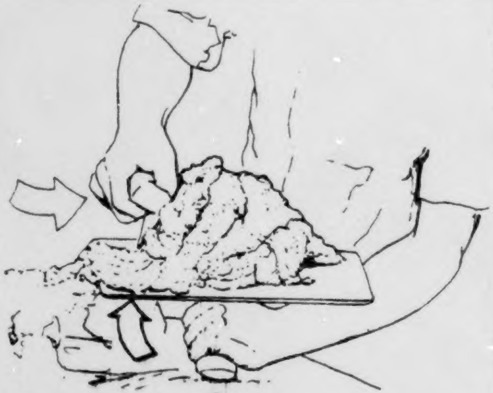
E. Apply Base Coat Plaster with Doubleback Technique
  1. Use hawk and trowel.
  2. Pick up plaster from board to hawk with hawk and trowel.
  3. Using hawk, put plaster on trowel.
  4. Spread plaster with trowel.
    a. lift trowel's leading edge.
    b. use sweeping motion from side to side.
    c. first layer is thin.
    d. immediately apply second or "double" coat.

F. Rod Base Coat
  1. Use rod to level base coat to dots and screeds.

G. Scarify Base Coat
  1. Use wire brush or scarifier to roughen surface before plaster sets (improves bonding of finish coat).

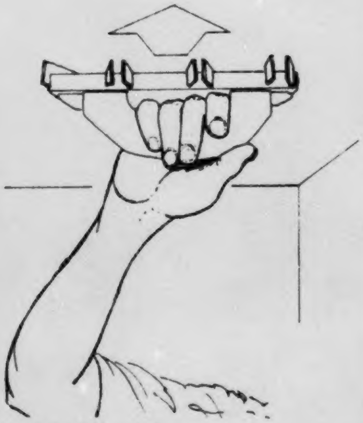
H. Mix Finish Coat Plaster
  1. Follow mixing step D (above) using proper proportions for finish coat plaster.

I. Apply Finish Coat
  1. Allow base coat to nearly dry.
  2. Remove protrusions from base coat using angle plane.
    a. scratch in the angle.
    b. featheredge the angle.

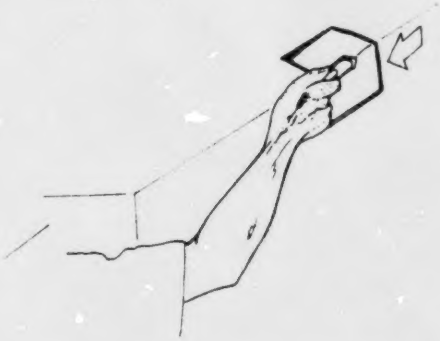

From Board to Hawk

From Hawk to Trowel

Spread Plaster


Using the Angle Plane

        c. scratch in between angles.
            (1) keep trowel as flat as possible.
    3. Apply thin scratch coat of finish plaster.
        a. allow to "draw up."
    4. Double up over scratch coat.
        a. bring final finish plaster to 1/16" to 1/8" thick.
    5. "Sweeten" the angles.
    6. "Sweeten" rest of area.
    7. Water trowel whole surface.
        a. repeat at least twice until finish sets.
    8. Brush water over surface with felt finish brush.



J. Clean Up
    1. Clean up tools and equipment.
        a. remove all dried plaster.
    2. Clean up job site.

11.1.2 Cement Finishing Processes

A. Site Preparation
    1. Read blueprint to establish location of slab and type of finish.
    2. Establish grade.
        a. excavate to grade.
        b. lay vapor barrier in place.
        c. apply gravel and level to grade.
        d. check for level using builder's level.

3. Form preparation and placement.
    a. set corners.
    b. set (hand) form according to plan.
    c. check form for level, square, plumb, etc.
    d. set screed stakes.
        (1) check for appropriate height.
    e. compact gravel.
        (1) use tamper or roller.
    f. re-check grade.

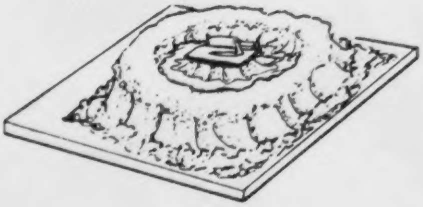
B. Determining Concrete
  1. Determine exposure.
    a. mild-- not exposed to abrasion or severe weather.
    b. normal--watertight structures and/or weather.
    c. severe--subjected to severe wear, weather and weak acids or alkali solutions.
  2. Determine desired cement slump.
    a. use slump recommended for given job.
    b. the more severe the exposure, the lower the slump; less water will create lower slump, more strength

High Slump

Low Slump

C. Mixing Cement
  1. Proportions for low slump.
    a. 4 1/3 parts sand (moist)
       1 3/4 parts cement (dry)
       2 2/3 parts aggregate - 1 1/2"
       1 part water.

2. Proportions for high slump.
    a. 4 1/3 parts sand (moist)
       1 3/4 parts cement (dry)
       2 2/3 parts aggregate - 1 1/2"
       2 parts water.
3. Mixing ingredients.
    a. with hoe or shovel, mix dry ingredients thoroughly in wheelbarrow or box.
    b. create mound with depression in center.
    c. slowly add 1/2 to 3/4 water folding in dry ingredients.
    d. when thoroughly mixed, determine if remaining water is required.
4. Testing concrete mix.
    a. for consistency.
        (1) shovel or pour part of mixture onto clean, damp surface.
        (2) work with hoe or shovel.
        (3) lightly float mixture until spaces between aggregate are filled.
        (4) concrete should slide off shovel.
        (5) concrete should be wet enough to stick together without crumbling.
    b. for slump.
        (1) form cone of mix on clean, damp surface.
        (2) measure height immediately.
        (3) note decrease in height.
            (a) small decrease denotes low slump.
            (b) large decrease denotes high slump.



D. Placing Concrete

1. Shovel or pour as close to final shape as possible.

E. Consolidate

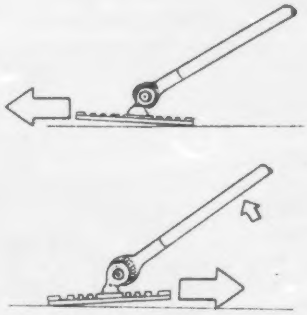
1. Tamp with tamper or jitterbug.

or

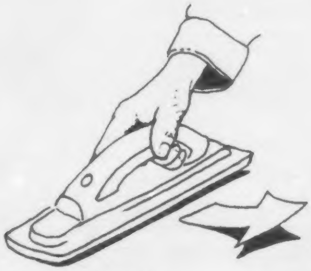
1. Use straight edge to rod concrete before tamping.
2. Remove screed stakes.

F. Finish

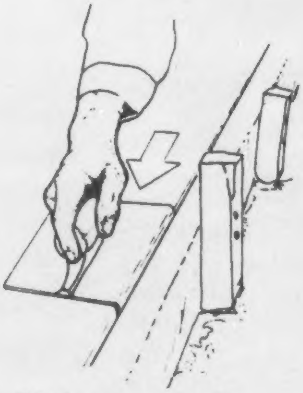
1. Use bullfloat to level surface immediately.
2. Use darby to level edges of slab; avoid overworking surface.
3. Allow bleed water and sheen to dissipate before continuing.
4. Round off open edges to prevent spalling (chipping); use edger.
5. Cut control joints (if any) using jointer or groover.
6. Allow concrete to harden to the degree that a person's weight leaves ¼" or less imprint before continuing.
7. Float with a wide arc using hand float; continue until smooth.
8. Trowel surface.
    a. place trowel flat against surface.
    b. sweep in wide arc, overlapping previous stroke slightly (about 2").



Bull Floating



Floating



Edging

9. After surface moisture from first troweling has evaporated, begin second troweling with smaller trowel.
    a. blade tilted slightly (trailing edge down) to apply increased pressure.
10. Repeat, using smaller trowel and increased angle until trowel makes singing, ringing, scraping noise across surface.
11. Texture surface (if desired) using broom or burlap.

G. Curing
1. Water cure.
    a. apply water with hose and misting spray nozzle.
    b. continually mist with water for minimum of three days, and longer if temperature is below 70^0 F.

or

2. Mechanical barrier cure.
    a. use waterproof paper or plastic film sheets to seal in water and prevent evaporation.
    b. should be covered as soon as finishing is completed.

or

3. Chemical membranes.
    a. applied to concrete with spray mister as soon as water sheen disappears.
    b. complete and uniform coverage is essential.
    c. usually two applications are required.

11.1.3 Bricklaying Processes

A. Preparation

  1. Read blueprint to establish location and size and type of project; also to determine bonding pattern and type/size of brick or block to be used

B. Layout

  1. Establish wall line(s) on surface.
     a. use chalkline.
  2. Lay dry course of bricks, allowing room for mortar head joints.
     a. mark joints on surface; move bricks aside.
  3. re-check square.

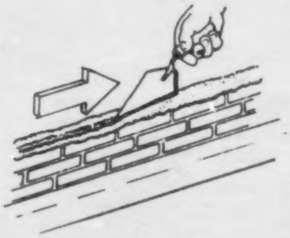
C. Mortar

  1. The bonding agent that ties masonry units together.
  2. Ingredients.
     a. cementitious materials.
        (1) Portland cement, hydrated lime
     b. sand (aggregate).
     c. water.
  3. Types.
     a. three types recommended for mortar use:
        (1) type 1--general use.
        (2) type 2--used when moderate sulfate resistance or moderate hydration (curing) heat is wanted.
        (3) type 3--used when high early strength is desired.
     b. select mortar to suit job.

4. Mix mortar.
    a. proportions for type N.
        (1) 1 part Portland cement
            1/2 to 1 1/4 parts lime
            3 3/4 to 4 1/2 parts sand.
    b. mix dry materials in box, add water slowly to consistency that is easy to spread but clings to vertical faces.
    c. shovel onto mortar board.

D. Trowel Mechanics
    1. Hold trowel with fingers under handle, thumb on top of ferrule.
    2. Work mortar into pile in center of board.
    3. Smooth off place with backhand stroke.
    4. Cut small amount from pile with forehand pulling motion.
    5. Scoop cut mortar onto trowel with quick clockwise turn of wrist.

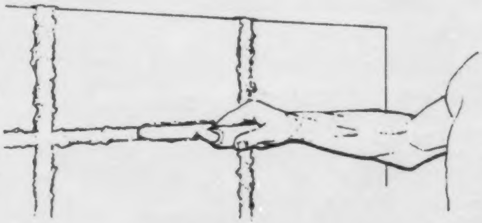
E. Mortar Application
    1. Spread mortar bed joint.
        a. trowel is unloaded by snapping arm backward in direction of mortar line and tilting outside edge up.
    2. Furrow bed joint.
        a. with trowel at angle, pat bed joint to create uniform bed.



Furrow Bed Joint

F. Brick Application
   1. Lay corner brick exactly on corner point.
      a. set level and square to wall line.
      b. check.
   2. Lay remaining bricks (4 to 5, depending on project) in lead corner, troweling mortar onto head joints.
   3. Level with builder's level.
      a. trowel handle may be used to tap bricks on outside, top edge to level.
   4. Line up bricks using edge of level on outer wall.
   5. Begin next lead corner.
   6. Repeat the sequence.
   7. Work toward center.
   8. On subsequent courses, use line level to determine level; check joint sizes for uniformity.
   9. Strike joints.
      a. for uniformity, using long jointer for bed joints, short jointer for head joints.
      b. when mortar can be indented with minimal thumb pressure.
   10. Brush project when mortar is stiff, or at end of day.

G. Clean Tools with Water and Brush.



Striking the Joints

II.1.4 Tile Setting Processes

A. Observe Job to be Done

   1. Decide on preparation work (if any) to be done; may recall previous trade person to complete or rework area.

B. Read Blueprint.

   1. Determine layout required to accomplish blueprint goals.
      a. the following blueprint characteristics and symbols must be considered.
         (1) sealing.
         (2) lines.
         (3) orthographic.
         (4) isometric.
         (5) architectural room schedule.
         (6) architectural symbols.

C. Lay Out Job

   1. Measure wall or floor.
      a. use measuring tapes and/or rules.
   2. Find center line.
   3. Determine tile sizes for required cuts.
   4. Make cuts.
      a. use nippers.
   5. Plan to float wall to get the largest cuts possible.
   6. Plan to eliminate unsightly cuts.

D. Square Floor or Wall

   1. To ensure all areas will be regular and true.
      a. use builder's square and measuring tapes.

E. Set Screeds
    1. Strip wall or floor with soft mortar.
    2. Imbed wood lattice into soft mortar to insure plumb and level intermediate surface.

F. Mix Mortar
    1. Determine grade quality and moisture content of sand.
    2. Proportions for mix.
        a. general (non-floor).
           3 parts sand
           1 part cement
           1 part lime.
        b. for floors.
           4 to 1 drypack mix.

G. Apply Mortar to Walls or Floors Over Screeds
    1. Use hawk and trowel.

H. Float Walls or Floors
    1. Run straight edge over surface, removing excess mortar between screed openings.

I. Remove Wood Screed

J. Fill in Screed Indentations
    1. Apply mortar.
        a. use hawk and trowel.
    2. Smooth area with dago stick.

K. Mix Setting Cement
    1. Achieve proper consistancy and adhesion.

L. Apply Setting Cement
    1. Use serrated trowel or float trowel according to manufacturer's recommendations.

M. Set Tile
    1. Into setting cement.
    2. Install (sets) cuts up side(s).
    3. Beat tile into setting cement with wooden block (may use mallet with block).
    4. Clean set tile with water and cheese cloth.
    5. Level tile courses.
        a. use level and straight edge.
    6. Repeat until wall or floor area is covered.

N. Clean Up
    1. Wash down all tiles and joints with water and cheesecloth or brush.

O. Mix Grout
    1. Follow manufacturer's recommendations.

P. Apply Grout
    1. Use rubber float or recommended grouting tool.
    2. Remove excess grout with sponge or cheesecloth.

Q. Polish and Clean Tiles
    1. Polish glazed tiles.
    2. Clean unglazed tiles.

R. Caulk
    1. Follow manufacturer's recommendations.

SUGGESTED READING

1. NAHB
   Incentive Apprenticeship Training for Cement Masons

   NAHB, 1979

2. NAHB
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   The Art of Tile Setting

   C. A. Bennett Co. 1954

12.0 Basic Trowel Trade Techniques

INSTRUCTIONAL OUTCOMES: Student will demonstrate and execute basic trade skills by completing a project to the satisfaction of the instructor.

INTRODUCTION: This instructional unit provides students an opportunity to practice techniques followed in the Pacific Northwest; appropriate techniques will have been learned in previous topics in this guide.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
12.1 Project Steps	Explain and Discuss
12.1.1 Plastering Processes	Administer Project Sheet
A. Site Preparation	
1. Check site for proper inspection certification.	
2. Perform visual check for level, plumb and square/true corners.	
3. Review plans and specifications.	
B. Select Type of Plaster to be Used	
1. Determined by base material and plan specifications.	
C. Set Dots and Screeds in Base Material	
D. Mixing Base Coat Plaster	

E. Apply Base Coat Plaster with Doubleback Technique

F. Rod Base Coat
  1. Use rod to level.

G. Scarify Base Coat
  1. Use wire brush or scarifier to roughen surface.

H. Mix Finish Coat Plaster

I. Apply Finish Coat
  1. Allow base coat to nearly dry.
  2. Remove protrusions with angle plane.
    a. scratch in angle.
    b. featheredge angle.
    c. scratch in between angles.
      (1) keep trowel flat.
  3. Apply thin scratch coat.
  4. Double up over scratch coat to 1/16 to 1/8" thick.
  5. "Sweeten" angles.
  6. "Sweeten" surfaces.
  7. Water trowel surface, at least twice.
  8. Brush water with felt finish brush.

J. Clean Up

12.1.2 Cement Finishing Processes
 A. Site Preparation
  1. Read blueprint to establish location of slab and type of finish.

2. Establish grade.
    a. excavate to grade.
    b. place vapor barrier.
    c. apply gravel, level to grade.
    d. check for level using builder's level.
3. Form preparation and placement.
    a. set corners.
    b. set (hand) form according to plan.
    c. check form for level, square, plumb, etc.
    d. set screed stakes to height.
    e. compact gravel with tamper or roller.
    f. recheck grade.

B. Determine Concrete Type by Determining Exposure
    1. Determine desired cement slump.

C. Mix Cement
    1. Proportions
        4 1/3 parts sand (moist)
        1 3/4 parts cement (dry)
        2 2/3 parts aggregate - 1 1/2"
        1 part water.
    2. Mix ingredients.
        a. with hoe or shovel, mix dry ingredients thoroughly.
        b. create mound with depression in center.
        c. slowly add 1/2 to 3/4 water folding in dry ingredients.
        d. when thoroughly mixed, determine if remaining water is required.

3. Testing concrete mix for consistency; for slump.

D. Place Concrete
   1. Shovel or pour as close to final shape as possible.

E. Consolidate; tamp with tamper or jitterbug or use straightedge to rod concrete before tamping.
   1. Remove screed stakes.

F. Finish
   1. Use bullfloat to level surface immediately.
   2. Use darby to level edges of slab; avoid overworking surface.
   3. Allow bleed water and sheen to dissipate before continuing.
   4. Round off open edges to prevent spalling (chipping); use edger.
   5. Cut control joints (if any) using jointer or groover.
   6. Allow concrete to harden to the degree that a person's weight leaves ¼" or less imprint before continuing.
   7. Float with a wide arc using hand float; continue until smooth.
   8. Trowel surface.
      a. place trowel flat against surface.
      b. sweep in wide arc, overlapping previous stroke slightly (about 2").

9. After surface moisture from first troweling has evaporated, begin second troweling with smaller trowel.
    a. blade tilted slightly (trailing edge down) to apply increased pressure.
10. Repeat, using smaller trowel and increased angle until trowel makes singing, ringing, scraping noise across surface.
11. Texture surface (if desired) using broom or burlap.

G. Cure
1. Select appropriate curing method and carry out according to manufacturer's specifications.

12.1.3 Bricklaying Processes

A. Preparation
1. Read blueprint to establish location, size and type of project; also to determine bonding pattern and type/size of brick or block to be used.

B. Layout
1. Establish wall line(s) on surface with chalkline.
2. Lay dry course of bricks, allowing room for mortar head joints.
    a. mark joints on surface; move bricks aside.
3. Recheck for square.

C. Mix Mortar

1. Proportions for type N.
   1 part Portland cement
   1/2 to 1 1/4 parts lime
   3 3/4 to 4 1/2 parts sand.
2. Mix dry materials in box, add water slowly to consistency that is easy to spread but clings to vertical faces.
3. Shovel onto mortar board.

D. Apply Mortar

1. Spread mortar bed joint.
   a. trowel is unloaded by snapping arm backward in direction of mortar line and tilting outside edge up.
2. Furrow bed joint.
   a. with trowel at angle, pat bed joint to create uniform bed.

E. Lay Bricks

1. Lay corner brick exactly on corner point.
   a. set level and square to wall line
   b. check.
2. Lay remaining bricks (4 to 5, depending on project) in lead corner, troweling mortar onto head joints.
3. Level with builder's level.
   a. trowel handle may be used to tap bricks on outside, top edge to level.
4. Line up bricks using edge of level on outer wall.
5. Begin next lead corner.
6. Repeat the sequence.
7. Work toward center.

8. On subsequent courses, use line level to determine level; check joint sizes for uniformity.
9. Strike joints.
   a. for uniformity, using long jointer for bed joints, short jointer for head joints.
   b. when mortar can be indented with minimal thumb pressure.
10. Brush project when mortar is stiff, or at end of day.

F. Clean Tools

12.1.4 Tile Setting Processes

A. Preparation
   1. Decide on preparation work (if any) to be done.

B. Read Blueprint
   1. Determine layout required to accomplish blueprint goals.

C. Lay Out Job
   1. Measure table top.
   2. Find center line.
   3. Determine tile sizes for required cuts.
   4. Make cuts with nippers.
   5. Plan to float surface to get the largest cuts possible.
   6. Plan to eliminate unsightly cuts.

D. Mix Mortar
   1. Determine grade quality and moisture content of sand.
   2. Proportions for mix.
      a. general (non-floor).
         3 parts sand
         1 part cement
         1 part lime.
      b. for floors.
         4 to 1 drypack mix.

E. Apply Mortar to Table Top with Hawk and Trowel

F. Float Table Top
   1. Run straight edge over surface, removing excess mortar.

G. Mix Setting Cement or Use Thinset
   1. Achieve proper consistancy and adhesion.

H. Apply Setting Cement
   1. Use serrated trowel or float trowel according to manufacturer's recommendations.

I. Set Tile
   1. Into setting cement.
   2. Install (sets) cuts, if any, up side(s).
   3. Beat tile into setting cement with wooden block (may use mallet with block).
   4. Clean set tile with water and cheese cloth.

5. Level tile courses.
   a. use level and straightedge.
6. Repeat until table top is covered.

J. Clean Up
   1. Wash down all tiles and joints with water and cheesecloth or brush.

K. Mix Grout, Following Manufacturer's Recommendations

L. Apply Grout
   1. Use rubber float or recommended grouting tool.
   2. Remove excess grout with sponge or cheesecloth.

M. Polish and Clean Tiles
   1. Polish glazed tiles.
   2. Clean unglazed tiles.

N. Caulk
   1. Follow manufacturer's recommendations

PLASTERING PROJECT SHEET

1. Two-coat gypsum neat plaster base with gypsum lime putty trowel finish top coat.

The student will complete the project, using tools properly and safely, to industry standard.

REQUIREMENTS

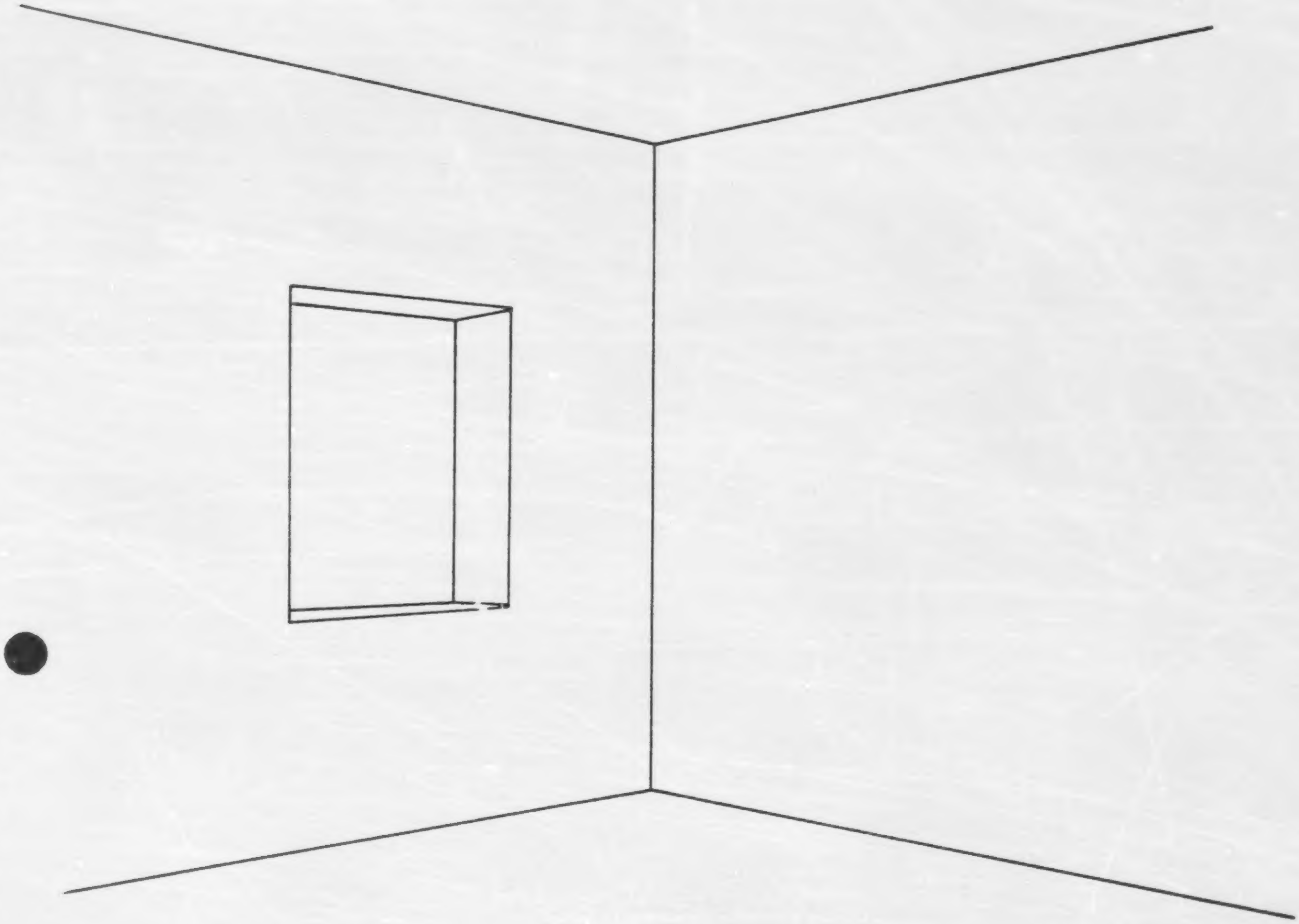
A room corner or mock-up with gypsum board lath surface.

TOOLS

hawk
trowel
scarifier
pointing trowel
margin trowel
straight edge (rod)
darby
featheredge
floats
brush

MATERIALS

gypsum neat plaster
water
sand
gypsum gauging plaster
lime putty
dots and screeds



PLASTER MOCK-UP
CORNER WALLS WITH WINDOW OPENING

STEPS TO COMPLETION:

1. Check base (lath) material for completion, ready for plastering.

2. Check for level, plumb and square.

3. Review plans.

4. Set dots and screeds.
   base coat plaster ratio of
   1:2½ sand to plaster

5. Mix base coat plaster.

6. Apply base coat plaster using doubleback technique.

7. Rod base coat.

8. Scarify base coat.

9. Mix finish coat plaster.
   finish coat plaster ratio of
   1 part gypsum gauging plaster:2 parts lime

10. Apply finish coat after base coat has nearly dried. (Ensure that all protrusions on base coat have been eliminated by using angle plane.

11. First finish coat will be thin scratch coat.

12. After first finish has "drawn up," double up to thickness of 1/8 to 1/16".

13. Sweeten angles and surfaces.

14. Water trowel entire surface, at least twice until finish sets.

15. With felt finish brush, brush water over surface.

16. Clean up.

CEMENT FINISHING PROJECT SHEET

1. Concrete slab--cement finishing.

The student will pour and finish a concrete slab, using tools and materials safely and correctly, to industry standards.

REQUIREMENTS

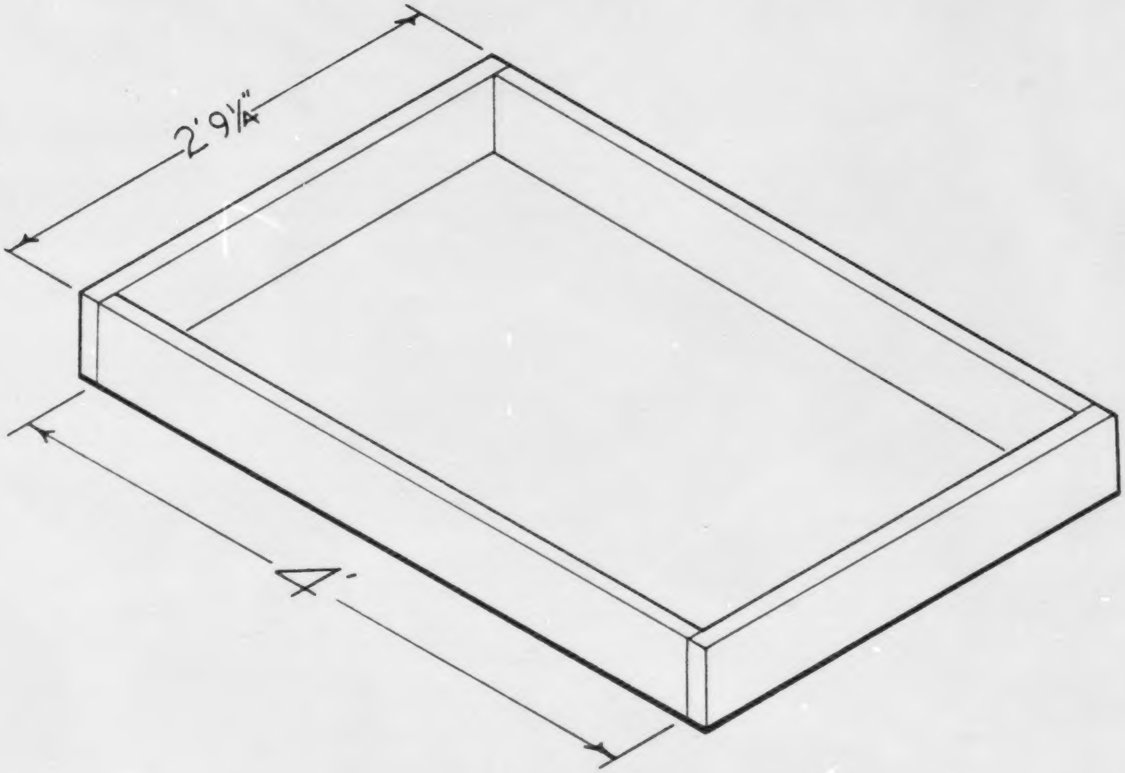
A site to pour concrete slab.

TOOLS

trowels
darby
rod
tamp
steel tape measure
framing square
pencil
spirit level
square nosed shovel
kumalong or concrete rake
wheel barrow
mixing board
hammer
saws
bull float

MATERIALS

portland cement
sand
aggregate
water
lumber for forms
nails for forms
screed stakes (if needed)



2	2"X6"X8'	
8	#16 DUPLEX NAILS	
QTY.	DESCRIPTION	PART NO.

STEPS TO COMPLETION

1. Read plan to establish location of slab and type of finish.
2. Establish grade; includes excavating to grade, laying vapor barrier, applying gravel and leveling to grade, checking for level with spirit level.
3. Prepare and place form; includes setting corners, setting form, checking for level, square, plumb, setting screed stakes, compacting gravel with tamper or roller and re-checking grade.
4. Determine the type of concrete to be used and desired cement slump.
5. Mix the cement.
6. Test mix for consistency and slump.
7. Place concrete.
8. Consolidate concrete using tamper or jitterbug.
9. Rod concrete with straight edge; remove screed stakes if used.
10. Finish concrete slab; includes using bullfloat to level surface, using darby to level edges of slab, rounding off open edges with edger, cutting control joints with jointer or groover, floating with hand float, troweling surface.
11. Allow slab to cure.

TILE SETTING PROJECT SHEET

1. Setting tile

The student will complete a tile table top, following working drawings, using proper tools safely, and to industry standard.

REQUIREMENTS

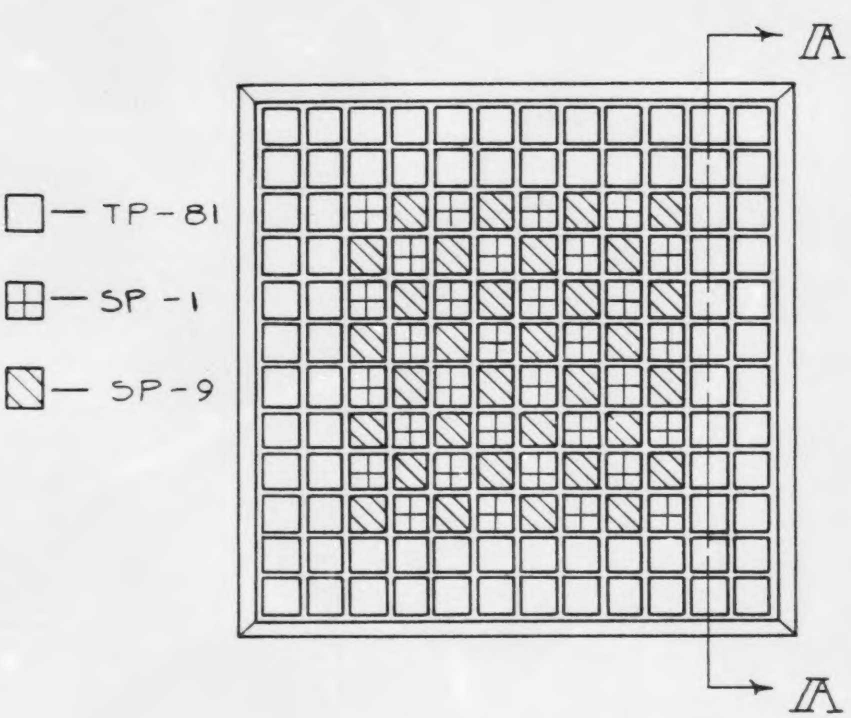
A table top

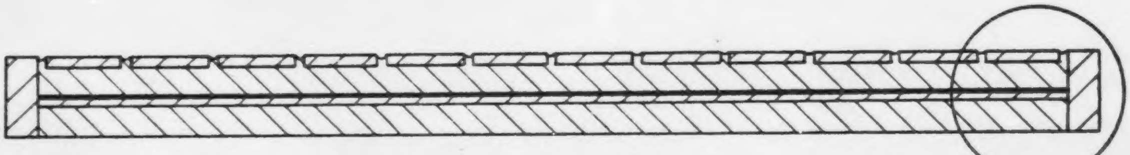
TOOLS

serrated trowel
margin trowel
spirit level
framing square
rubber float
sponge
rod
chalkline
tapping block and mallet

MATERIALS

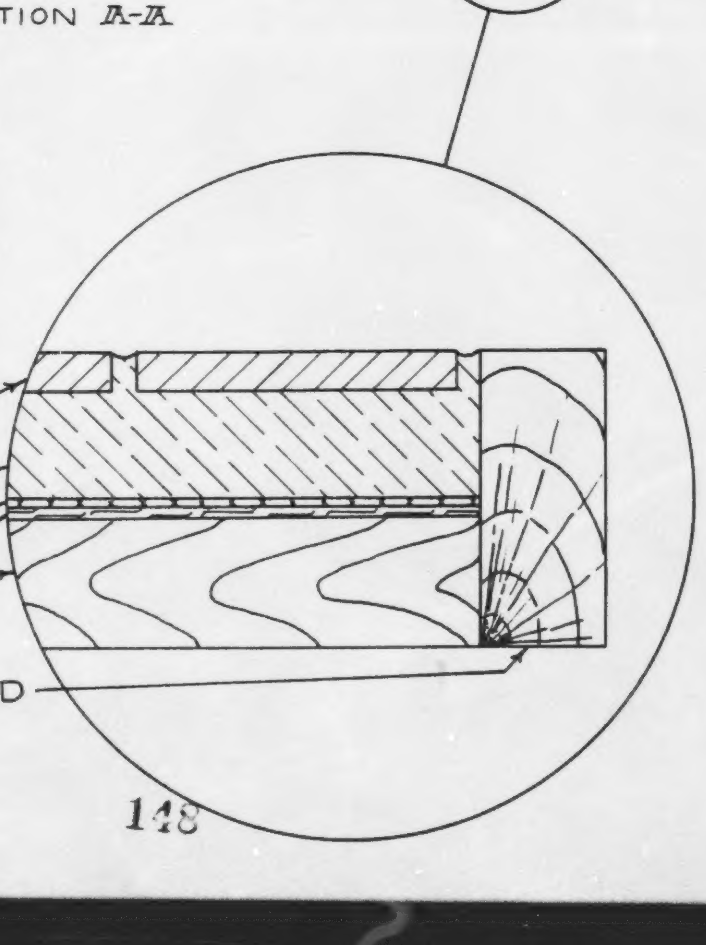
tiles
thinset
drypack
float strips
grout mix
cheesecloth





SECTION A-A

32	SP-1 TILE
32	SP-9 TILE
80	SP-81 TILE
1	36"X36"X 5/8" PLYWOOD
1	1"X2" X 96" OAK FACING
1	36"X36" GALV. MET. LATH
1	36"X36" No. 15 FELT
QTY.	DESCRIPTION



STEPS TO COMPLETION

1. Check table top for square
2. Layout table top according to drawing using steel tape, chalkline.
3. Layout tile (dry) and remove.
4. Mix drypack mortar and apply to surface.
5. Tamp to consolidate.
6. Plate float strips along two edges. (May be ommitted.)
7. Rod (straight edge) dry pack to level.
8. Apply thinset with serrated trowel.
9. Place tiles according to diagram pattern.
10. Check tile joints for uniformity and straightness.
11. Beat tile with block and mallet.
12. Clean tile with water and cheesecloth.
13. Level tile with level and straightedge.
14. Clean tile and joints.
15. Mix grout following manufacturer's recommendation.
16. Apply grout to joints using rubber float.
17. Remove excess grout with sponge or cheesecloth and water.
18. Polish glazed tiles.
19. Clean unglazed tiles.
20. Clean up area.
21. Allow project to set untouched for two or three days; drypack and thinset and grout drying time will vary according to temperature, humidity, etc.

TROWEL TRADES PROJECT SHEET

1. Brick and block barbecue unit.

REQUIREMENTS

Flat surface to lay brick and block piers for unit. Metal grill to span piers.

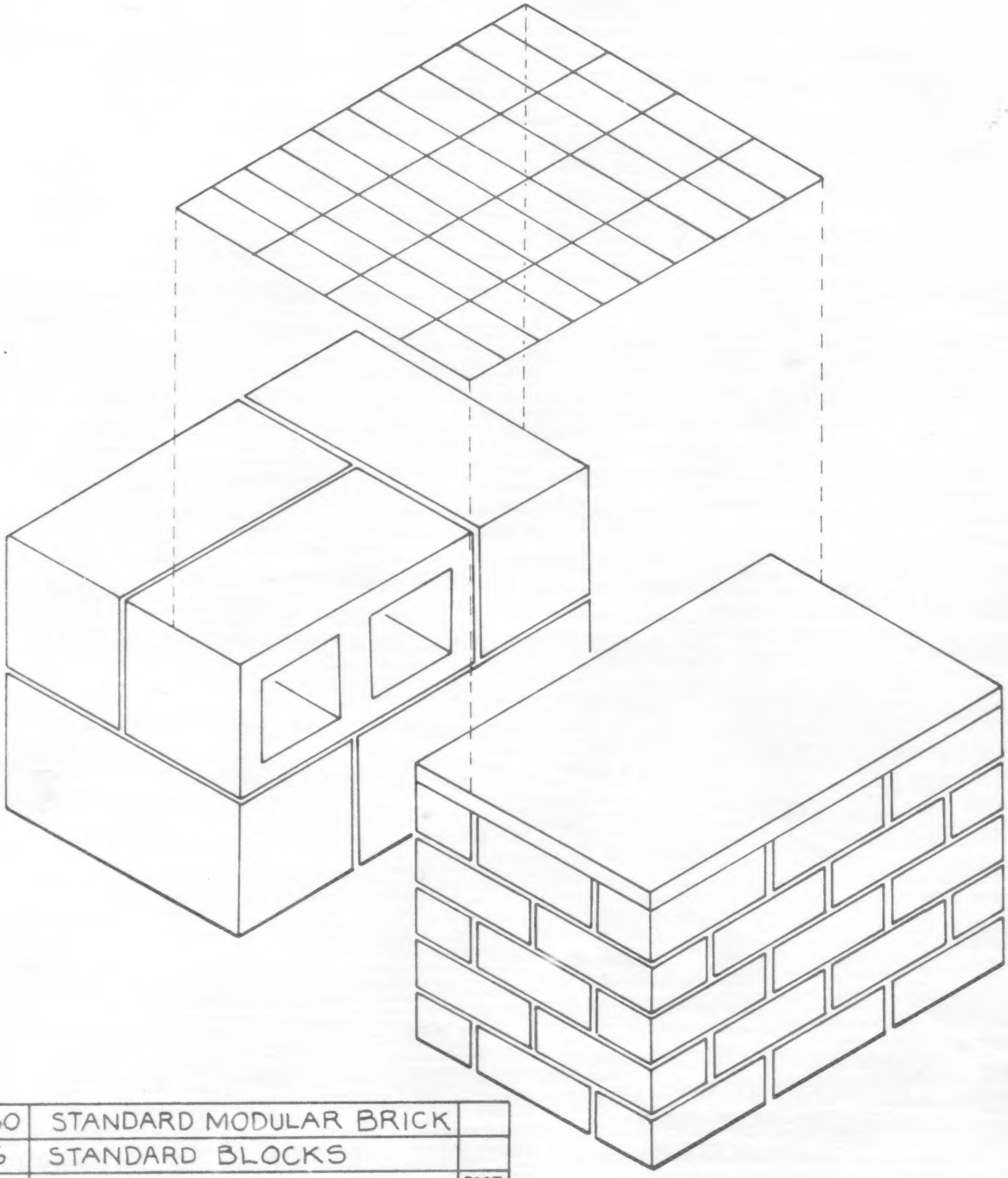
TOOLS

mortar board
trowels
jointing tool--striker
spirit level
brushes
chalkline
metal tape measure
framing square

MATERIALS

standard modular bricks
standard wall two-core blocks
patio block capstone
portland cement
hydrated lime
sand
water
mixing box for mortar
reisodium phosphate
household detergent

The student will complete a barbecue unit consisting of two piers, using tools correctly and safely and working to industry standards.



60	STANDARD MODULAR BRICK	
6	STANDARD BLOCKS	
QTY.	DESCRIPTION	PART NO.

STEPS TO COMPLETION

1. Layout pier locations on flat surface using steel tape, chalkline and square
2. If project is being done at final location, be sure pier layouts are parallel to each other.
3. Determine the number of bricks and blocks required.
4. Lay out materials, at least first course of each pier.
5. Mix mortar, using appropriate proportions for first pier.
   (Generally Type N mortar is correct for this project.)
   1 part portland cement
   ½ to 1 1¼ parts hydrated lime
   3 3/4 to 4 1/2 parts sand
   water to provide easy spreading material that clings to vertical surfaces
6. Select pier to complete first; complete before beginning second pier.
7. Lay first course of bricks or blocks (use bed joint if pier is at final resting site).
8. Check alignment with layout.
9. Check for level.
10. Lay second course (see drawing for layout pattern).
11. Check for square, level and plumb.
12. Lay remaining courses according to drawing, checking each course for level, plumb and square.
13. Tool or strike joints when mortar can be indented with thumb without excessive pressure.
14. Repeat steps 5 through 13 for second pier, using other masonry unit.
15. When mortar is dry, use stiff bristled brush to clean pier surface and remove mortar burrs.
16. Clean up tools and job site.
17. When mortar is thoroughly set and cured, clean masonry pier surfaces using ½ cup trisodium phosphate and ½ cup household detergent per gallon of water.
18. Rinse and brush.
19. Clean up project site.

APPENDIX

OCCUPATIONAL ANALYSIS

(6)

Task Analysis

Bricklayer

iLS

instructional learning systems

Task Analysis

Bricklayer

USOE Instructional Group Code: 17100400
DOT Number: 861.381-018

ODE Specialists:
Ralph Little, Construction
John Barton, Curriculum Development

Date Analysis Completed: February 1, 1979

Analyst:
Jim McNannay, Business Manager, Local #1, Bricklayers and Allied Craftsmen, Portland

Task Inventory Review Committee:
Al Thomas, Apprenticeship Coordinator, Local #1, Bricklayers and Allied Craftsmen, Portland
Bill Belanger, Recording Secretary of Local #1, Bricklayers and Allied Craftsmen, Portland
Ray Hord, Part-time Instructor, Apprenticeship School, Local #1, Bricklayers and Allied Craftsmen, Portland
Larry G. Gilbertson, President, The Henson Company of Oregon, Inc., Portland
Matthew J. Bromley, Vice President, Bromley Masonry, Inc., Portland
James R. Gorsage, President, Howard Jacobs Masonry, Portland

TASK INVENTORY

Page 1

BRICKLAYER
Job Title

Jim McNannay
Analyst

INSTRUCTIONS:
List each manipulative and knowledge skill relating to the job listed above. To the right of the page are three sections of columns asking specific questions about the Entry Level, Frequency of Performance and Instruction Attained At. An "X" should be placed, by the analyst, opposite each task in the appropriate box of the "ENTRY LEVEL" and "FREQUENCY OF PERFORMANCE" sections. Section three, "INSTRUCTION ATTAINED AT" is to be completed by state representative persons selected by the state department specialist.

Duty No.	Task No.	Task Description	Entry Level		Frequency of Performance			Instruction Attained at			
			Entry	On The Job	Small Amount	Average Amount	Great Amount	High School	Community College	On-the-Job Training	Related Training
1	0	USES MASONRY TOOLS		X			X			X	
	1	Use jointer to smooth mortar joints		X			X			X	
	2	Use brick set to cut brick or block		X		X				X	
	3	Use trowel to apply, spread, shape mortar		X			X			X	X
	4	Use chalk line to lay out first course of brick or block		X	X					X	X
	5	Use plastic or wood line block to keep line tight		X			X			X	
	6	Use metal line pin to secure line at both ends of course height		X			X			X	
	7	Use mason's line to keep brick level, straight and plumb		X			X			X	X
	8	Use trig to prevent line sag		X			X			X	X
	9	Use six-foot folding rule		X			X			X	X
	10	Use retractable steel tape		X			X			X	X
	11	Use miter square		X	X					X	
	12	Use T-bevel square		X	X					X	
	13	Use steel framing square		X	X					X	
	14	Use utility knife		X	X					X	
	15	Use bolt cutter to cut reinforcing wire		X			X			X	
	16	Use tuck pointer to tuck and point mortar in open joints		X	X					X	
	17	Use brush to brush down jointed walls		X			X			X	
	18	Use brick hammer to strike brick set		X		X				X	
	19	Use plug hammer to strike chisel to cut holes in masonry walls		X	X					X	
	20	Use masonry table saw to cut masonry units		X			X			X	X
	21	Use scaffold to stand on and to support materials		X			X			X	
	22	Use caulking gun to place caulking substance		X	X					X	
	23	Use pressure cleaner to clean walls		X	X					X	
	24	Use power hammer to chip or cut masonry		X	X					X	
	25	Use hammer drill to drill holes		X	X					X	
	26	Use screwdriver to attach metal ties		X	X					X	
	27	Use skil saw to cut raggles		X	X					X	
2	0	MAINTAINS EQUIPMENT		X	X					X	X
	1	Clean hand tools with water		X	X					X	X

TASK INVENTORY

Page 2

BRICKLAYER
Job Title

Jim McNannay
Analyst

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			Entry	On The Job	Small Amount	Average Amount	Great Amount	High School	Community College	On-the-Job Training	Related Training
3	0	PRACTICES SAFETY		X		X				X	X
	1	Use safety goggles as required		X			X			X	X
	2	Use dust mask when dry cutting		X			X			X	X
	3	Use rubber gloves and apron during wet cutting and cleaning		X		X				X	X
	4	Lift heavy materials using recommended procedure		X		X				X	X
	5	Report defective tools, machines and equipment to supervisor		X	X					X	
	6	Keep tools sharp and clean		X	X					X	
	7	Report all accidents to supervisor		X	X					X	
	8	Clear work area of scraps and litter		X		X				X	X
	9	Use only approved scaffolding		X			X			X	
	10	Use proper signals when working with crane		X	X					X	
4	0	PERFORMS GENERAL TASKS		X		X				X	X
	1	Solve problems in ratio and proportion		X	X					X	X
	2	Read blueprints									
	3	Interpret specification sheets		X	X					X	X
	4	Calculate basic problems dealing with area		X	X					X	X
	5	Calculate basic problems dealing with estimating		X	X					X	X
	6	Solve basic arithmetic problems		X	X					X	X
	7	Read measuring instruments graduated in fractions of an inch		X	X					X	X
	8	Read/interpret various types of levels		X		X				X	X
		THIS APPLIES IF EMPLOYED IN RESIDENTIAL FIELD ONLY									
5	0	CONSTRUCTS CHIMNEYS AND FIREPLACES									
	1	Read blueprints		X	X					X	
	2	Layout fireplace		X	X					X	X
	3	Build ash pit		X		X				X	
	4	Build firebox floor		X		X				X	X
	5	Build hearth		X		X				X	
	6	Build ash dump		X		X				X	
	7	Install damper		X		X				X	X
	8	Build smoke shelf		X		X				X	
	9	Build mantle		X		X				X	
	10	Install flue lining		X		X				X	
	11	Install firestop		X		X				X	
	12	Install flashing		X		X				X	
	13	Install cap		X		X				X	
	14	Clean tools		X		X				X	X

TASK INVENTORY

Page 3

BRICKLAYER
Job Title

Jim McNannay
Analyst

INSTRUCTIONS:

List each manipulative and knowledge skill relating to the job listed above. To the right of the page are three sections of columns asking specific questions about the Entry Level, Frequency of Performance and Instruction Attained At. An "X" should be placed, by the analyst, opposite each task in the appropriate box of the "ENTRY LEVEL" and "FREQUENCY OF PERFORMANCE" sections. Section three, "INSTRUCTION ATTAINED AT" is to be completed by state representative persons selected by the state department specialist.

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6	0	CONSTRUCTS WALLS		X			X			X	X
	1	Read blueprints		X	X					X	X
	2	Assemble tools		X		X				X	
	3	Use chalk line to establish wall line		X	X					X	X
	4	Use 3'-4' method (or variation of) with steel tape to determine squareness of chalk line		X	X					X	X
	5	Use level to measure uniformity of height		X	X					X	X
	6	Use story pole to measure course height		X	X					X	
	7	Use framing square to measure squareness of corners		X	X					X	X
	8	Apply mortar with trowel		X			X			X	X
	9	Lay brick using Western method		X			X			X	X
	10	Build head joints		X			X			X	X
	11	Build bed joints		X			X			X	X
	12	Install reinforcing ties as required		X		X				X	X
	13	Install flashing for doors, drains, windows		X	X					X	
	14	Install bracing to protect wall from falling down		X	X					X	
	15	Use covering to protect from freezing and staining		X	X					X	
	16	Install lintels and sills		X		X				X	
	17	Select joint bond according to specifications		X	X					X	
	18	Apply sealing agent to joints as required		X	X					X	
	19	Use masonry saw or hammer and chisel to cut brick		X		X				X	X

(6)
CEMENT FINISHER

OCCUPATIONAL ANALYSIS

State Department Code # 09
U.S.O.E. Instructional Group Code: 17.100400
D.O.T. # 844-884-014

PRINCIPAL INVESTIGATORS

State Department Specialist: RALPH LITTLE
Curriculum Staff Assigned: JOHN BARTON
Task Analyst (s): DICK LACEY
Date Analysis Completed: NOVEMBER 16, 1977

*NOTE: This occupation is a key occupation in Oregon as identified by Oregon Criteria.

TASK INVENTORY REVIEW COMMITTEE

Del French = President, Local 555, Cement Masons, 2215 S.E. Division
Portland, Oregon
Gene Nelson = E. Carl Schiewe, Contractor, 1074 NE. Davis,Portland
Bill Schaefer = Goldie Gentle Construction Co. 5241 N.E. 89th, Portland
Ray Nelson = Department of Public Works, City of Portland, Portland, Ore.

OREGON DEPARTMENT
OF EDUCATION
942 LANCASTER DRIVE N.E.
SALEM, OREGON 97310

VERNE A. DUNCAN
SUPERINTENDENT OF
PUBLIC INSTRUCTION

JAMES W. HARGIS
COORDINATOR,
CURRICULUM DEVELOPMENT
CAREER EDUCATION

TASK INVENTORY

Page 1

Cement Mason
Job Title

Dick Lacey
Analyst

INSTRUCTIONS:

List each manipulative and knowledge skill relating to the job listed above. To the right of the page are three sections of columns asking specific questions about the Entry Level, Frequency of Performance and Instruction Attained At. An "X" should be placed, by the analyst, opposite each task in the appropriate box of the "ENTRY LEVEL" and "FREQUENCY OF PERFORMANCE" sections. Section three, "INSTRUCTION ATTAINED AT" is to be completed by state representative persons selected by the state department specialist.

			Entry Level		Frequency of Performance			Instruction Attained at			
Duty No.	Task No.	Task Description	Entry	On The Job	Small Amount	Average Amount	Great Amount	High School	Community College	On-the-Job Training	Related Training
1	0	PREPARES SLAB SITE									
	1	Read job blueprint to establish location of slab	X		X						
	2	Use stakes to layout slab boundaries	X			X					
	3	Use builders level to shoot grade on each stake	X		X						
	4	Use 20oz. hammer to erect forms		X		X					
	5	Use builders level to assure accuracy of form placement.	X			X					
	6	Use folding rule and square to measure form angles	X		X						
	7	Establish location of screed stakes		X		X					
2	0	FINISHES CONCRETE									
	1	Place concrete at starting point of pour		X		X					
	2	Use straightedge to rod concrete		X		X					
	3	Use jitterbug to compact concrete		X		X					
	4	Use skip float to level surface		X		X					
	5	Use three foot Darby to level edges		X		X					
	6	Use edger to edge sides of slab		X		X					
	7	Use hand flat to smooth high and low spots		X		X					
	8	Use 18" hand trowel to trowel surface of concrete		X		X					
	9	Use wood hand float to smooth surface		X		X					
	10	Apply curing agent using sprayer with nozzle adjusted to fine mist		X			X				
	11	Use margin trowel to clean top surface of forms, tools and equipment									
	12	Use 18" hand trowel to trowel slab after floating		X			X				
	13	Use rollerbug to compact slab		X		X					
	14	Use skip float to level and seal surface of slab		X		X					
	15	Use hand flaot to smooth high and low spots in slab		X		X					
	16	Use machine with finish blades to machine trowel slab		X		X					
	17	Retrowel all edges by hand to remove edger mark		X		X					
	18	Roughen hardened surface of slab with heavy fiber or wire broom		X		X					

TASK INVENTORY

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Cement Mason
Job Title

Dick Lacey
Analyst

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			Entry Level		Frequency of Performance			Instruction Attained at			
Duty No.	Task No.	Task Description	Entry	On The Job	Small Amount	Average Amount	Great Amount	High School	Community College	On-the-Job Training	Related Training
2	20	Broom surface to remove laitance and expose surface aggregate		X		X					
	21	Use water to clean brooms thoroughly		X		X					
	22	Use brush to apply slurry of cement and water		X		X					
	23	Use acid mix to wash and clean slab		X		X					
	24	Use clean water to wash acid mix from slab		X		X					
	25	Use kneeboards to support body weight on wet concrete		X		X					
	26	Use hand level to level step risers		X		X					
	27	Use claw hammer to remove nails from forms		X		X					
	28	Use inside step tool to smooth cove of step		X		X					
	29	Use outside step tool to smooth top edge of riser		X		X					
	30	Use midget trowel to trowel face of step riser		X		X					
	31	Use damp brush to smooth face of riser		X		X					
3	0	PATCHES CONCRETE									
	1	Use chipping hammer to remove loose aggregate from surface to be patched.		X		X					
	2	Use brush to remove chips and dust		X		X					
	3	Use brush and water to dampen area to be patched		X		X					
	4	Apply bonding agent with brush		X		X					
	5	Fill area to be patched with dry pack concrete		X		X					
	6	Use hammer and wood block to tamp dry material flush with surface		X		X					
	7	Use brush to apply water to surface		X		X					
	8	Use hand stone to smooth and level patch		X		X					
	9	Use margin trowel to smooth surface		X		X					
	10	Use water to clean tools and equipment		X		X					

TASK INVENTORY

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Cement Mason

Job Title

Dick Lacey

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Duty No.	Task No.	Task Description	Entry Level		Frequency of Performance			Instruction Attained at			
			Entry	On The Job	Small Amount	Average Amount	Great Amount	High School	Community College	On-the-Job Training	Related Training
4	0	GRINDS, RUBS AND SACKS CONCRETE									
	1	Use chipping hammer to chip off heavy fins and projections		X		X					
	2	Use a hand held electric grinder to smooth surface of wall		X		X					
	3	Apply bonding agent to all deep holes and form tie cone holes		X		X					
	4	Use margin trowel and cork hand float as a hawk to apply stiff mud and to pack all large holes and form cone holes		X		X					
	5	Dampen surface of wall with water brush		X		X					
	6	Apply mud with float and work into all holes and uneven places		X		X					
	7	Use a piece of burlap with dry cement and sand mixture and work over surface		X		X					
	8	Use clean piece of burlap to wipe all excess mud and dry mix from surface		X		X					
	9	Use margin trowel, brush and water to clean tools and equipment.		X		X					